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PHILLIPS ACADEMY, ANDOVER, MASSACHUSETTS
DEPARTMENT OF ARCHAEOLOGY

BULLETIN III

A Narrative of Explorations in New Mexico, Arizona, Indiana, Etc.

TOGETHER WITH A BRIEF HISTORY OF THE DEPARTMENT

By WARREN K. MOOREHEAD, Curator

PRICE 75 CENTS (POSTPAID)

ANDOVER, MASS.
THE ANDOVER PRESS
1906

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The Trustees of Phillips Academy:

Gentlemen:

I herewith hand you my report upon the origin and development of this Department. During Mr. Peabody's lifetime the explorations and collections were made under his direction. Since 1902 the work has been done under and with the approval of the Honorary Director, Dr. Charles Peabody. I wish to thank the Honorable Trustees of Phillips Academy, Principal Alfred E. Stearns, and Dr. Peabody for cordial support rendered me.

Warren K. Moorehead.

November 10th, 1906.

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PREFACE.

BULLETIN No. III is not confined to descriptions of explorations. It was suggested by Mr. Alfred E. Stearns, Principal of the Academy, and Mr. James C. Sawyer, treasurer, that a BULLETIN suitable for distribution among the Alumni and friends of the school should be published. It must be remembered that Phillips Academy, Andover, is the only preparatory school in the world that possesses a fine museum and Department of Archaeology. The instruction given the students by the Department is not confined to archaeology, but embraces anthropology and kindred subjects: psychology, sociology, criminology, evolution, etc., all of which are treated as elementary courses.

While this report is not confined to the technicalities of explorations as explained above, yet it describes the work done for Mr. Peabody and also the explorations conducted by the Department since 1901 and as yet unpublished.

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FIG. 1 — DEPARTMENT OF ARCHAEOLOGY BUILDING

PHILLIPS ACADEMY, ANDOVER, MASS.

From a photograph by Mr. Guy Lowell.

A BRIEF ACCOUNT OF THE DEPARMENT OF ARCHAEOLOGY AT PHILLIPS ACADEMY.

In November, 1895, a short article on "Mound Exploration" appeared in the *Philadelphia Press*. The article did not differ essentially in character from others upon this subject. However, it attracted the attention of Mr. Robert Singleton Peabody, a gentleman residing in Germantown, Philadelphia, and he wrote to the editor for information, and the editor forwarded the letter to the author. Thus began a correspondence and acquaintance which culminated in the founding of the Department of Archaeology at Phillips Academy.

During the year, 1896, the author of this BULLETIN purchased a number of collections for Mr. Peabody. In the spring of 1897 he went to Farmington, New Mexico, in order to regain health and made collections at the Chaco Group and in the San Juan Valley. In November the same year he left Ohio and established himself in Phoenix, Arizona, and gave his time thereafter in Mr. Peabody's interests. From November until the first of June, 1898, he employed a number of men and dug in the adobe ruins in the Salado valley and collected from the surface of various sites. On returning to Ohio he visited the large village sites along the Ohio river, between the mouths of the Great Miami and the Wabash, exploring at Aurora, Lawrenceburg, etc.

In the fall he went to the Adirondacks and resided there three winters, and during this time occasionally visited Mr. Peabody and was in constant communication with him. Being unable to collect in person, he employed several competent collectors, notably Mr. Clifford Anderson, who excavated the cemetery at the mouth of the Wabash, collected at Flint Ridge, and in Tennessee, Arkansas, and elsewhere.

In March, 1901, Mr. Peabody and his wife, Margaret A. Peabody, founded the Department of Archaeology at Phillips. The foundation was sufficient for future maintenance, and to erect a beautiful building suitable for museum purposes, containing a large lecture hall, a library, and offices.

Mr. Peabody wished to improve the social condition of the students of the Academy. He dwelt upon his own boyhood at Phillips, laying particular stress upon the lack of a reading-room and meeting place for the boys, and upon the inadequate provision for the various societies and clubs. Mr. Guy Lowell, the distinguished architect of Boston, was asked to design a building that should contain adequate space for museum purposes, and at the same time combine the social features Mr. Peabody had in mind. The result is that after three years of occupation the building is entirely satisfactory. The two separate and distinct interests do not in any way conflict or inconvenience each other.

The building which is the home of the Department of Archaeology, while it was built but four years ago, seems a very part of the Academy. Surrounded by fine old elms, constructed of dark red bricks, with granite base and entrance motive, it is a building of great simplicity and dignity. It has all the charm of the old Colonial structures, with the added attractiveness of well designed modern work. It stands on the site of the original Phillips Academy.

The exterior has but little ornament, the interest being given by the triple arch motive on either side of the main entrance, which repeats on the ends, with the decoration being concentrated about the central feature. This portion is constructed of granite. Just beneath the pediment at the center, the Coat of Arms of the Academy is beautifully carved in Tennessee marble. At either side is a cartouche of the same material, the one on the left bearing the date 1778, the one on the right 1901.

The building is entered by broad granite steps flanked by large buttresses. The generous entrance hall, with its Doric columns, opens directly into the exhibition rooms, one on either side. These are well lighted and admirably arranged for the interesting and valuable collections they contain. There are eighteen large cases, but only a small proportion * of the specimens are shown ; the rest † being stored in the lower part of the cases and in the attic.

The whole first floor gives one an impression of spaciousness,

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*11,150 †44,778

FIG. 3 — DETAIL OF THE FRONT OF THE ARCHAEOLOGY BUILDING

quiet and charm, having the distinct character of a museum where one expects to find rare and unusual groups of objects. This floor also contains the Director's office, the Curator's office, and the cataloguing room.

In the exhibition room at the left is a handsome and massive fireplace, with mantel finished in Mexican onyx. The room to the right has a circular iron staircase extending to the story above. A broad staircase, set off by a graceful ornamental iron rail, leads to the second floor. Here again a generous hall opens, with the lecture hall on one side and the library on the other. The lecture hall has a small platform and is well adapted to day and evening use. It will accommodate 175 persons and belongs exclusively to the students after four o'clock, constituting a convenient meeting place for the various musical clubs, societies, etc.

The library serves to make the building whole and complete. It is not as large as might be desired, but it presents sufficient books for research along almost any line. Naturally, in a preparatory school, one would not expect as comprehensive a library as is found in colleges. It is finished in oak with a handsome fireplace. Including the room at the rear, the library has a capacity of 4000 volumes. It is furnished with all important magazines and with files of newspapers from the leading cities of the United States subscribed for by the students.

In the basement there is a fine dark room and developing room equipped with necessary chemicals for work in photography; various club rooms for athletics, school periodicals, chess, and golf clubs. All these rooms are furnished with desks and tables for use of the students.

The building is so designed that wings may be added if necessary. It is heated from the central plant and the whole structure is fire-proof. It cost $50,000.00 and the specimens are valued at $50,000.00 more.

Mr. Peabody's entire collection numbered some 38,000 specimens, and on the appointment of his son, Dr. Charles Peabody, as Director and the writer as Curator of the Department, the latter went to Germantown and expressed the collection to Andover. While the building was under construction, the exhibits were numbered, catalogued, and arranged in another building,

and were moved into their present quarters in March, 1903. At the present writing, October 10th, 1906, there are 55,928 specimens* in the museum. Most of these specimens were collected by or under the direction of the writer, although many persons have contributed to make the Andover collection what it is since the foundation of the Department. Next to Mr. Peabody's gifts, the largest accessions have been received from Mr. Clarence B. Moore of Philadelphia. Mr. Moore has carried on explorations in Florida, Alabama, and Georgia for the past ten or twelve years, and has made extensive collections and published a number of reports descriptive of his work. Mr. Moore very kindly presented the Department some thirteen hundred specimens of pottery, beads, stone implements, clay effigies, etc., covering almost the entire range of art among the Florida tribes. These are mounted in a case seven meters long, two and one-third meters high, and one and three-fourths meters wide. The drawing of the case and contents is reproduced in fig. 61. Mr. Moore's donation enabled the Department to present for the benefit of students a comprehensive idea of prehistoric times in Florida. It is the best single exhibit in the entire museum.

While a list of donors† and the various objects they have kindly presented the Department is appended to this report (see p. 170), several persons should be especially mentioned in this place. Mr. J. L. B. Taylor of Pineville, Missouri, sent the Department some five hundred stone and bone objects from village sites and caverns of southwest Missouri. Mr. J. W. VanKirk of Pottsgrove, Pennsylvania, gave us a thousand specimens, being pestles, axes, celts, projectile points, ornaments, hoes, etc., from the village sites along the Susquehanna river, Pennsylvania. Mr. Gilham of Hopland, California, formerly of San Francisco, presented a collection of one hundred obsidian implements from California. Miss Mollie Hall of Hopkinsville, Kentucky, sent three hundred and fifty archaeological objects from Tennessee. Messrs. E. R. Steinbrueck and Rev. A. T. Gesner sent a collection

* In round numbers. The last number in the catalogue is 41,763, but in many instances five to twenty specimens are entered under one number.

† Requests similar to the one presented on page 179 of this BULLETIN were sent to owners of archaeologic collections.

FIG. 2 — ONE OF THE EXHIBITION HALLS IN THE ARCHAEOLOGY BUILDING

of a hundred and fifty implements from the Mandan sites, North Dakota. These are especially interesting at this time, as Harvard University made a detailed study of the Mandan sites in the summer of 1905. It was suggested as a result of the investigations that the Mandans may have come from the Ohio valley. The writer of this report advanced the same theory in 1889*, and based it on a different line of argument.

Other collections of consequence were received from Mr. H. K. Deisher of Kutztown, Pennsylvania, who gave us certain pestles, obsidian implements, crania, etc., from California; Dr. Charles Peabody, material from Bushey Cavern, Maryland; Albert L. Addis of Albion, Indiana, unfinished ornaments and ceremonials, and through Mr. Addis' donation some new information was secured, and this has been of value in the study of "The So-Called 'Gorgets'"†, and the process of manufacture of Mr. Addis' specimens will be set forth in more detail in a future BULLETIN devoted to the "ceremonial" or "problematical" class.

The Department wishes to also thank several persons to whom it is indebted for past favors: Miss Mollie Hall, for information regarding the prehistoric remains in the vicinity of Hopkinsville, Kentucky; Dr. W. N. Wallace of Farmington, New Mexico, who accompanied the expedition to the Chaco Group as interpreter and rendered valuable assistance; Mr. William Foster made several hundred drawings of the specimens in the Phillips Andover Museum, and some of his sketches are reproduced in this BULLETIN. Thanks are tendered Dr. George H. Pepper of the American Museum of Natural History, New York; and Dr. F. W. Hodge, editor of the "American Anthropologist", for the loan of six illustrations and for information.

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*Fort Ancient, p. 115.

† *Bulletin II, The So-Called "Gorgets"*, Department of Archaeology. Phillips Academy, Andover, Massachusetts. C. Peabody and W. K, Moorehead, 1906.

SKETCH OF MR. ROBERT SINGLETON PEABODY.

Mr. Robert Singleton Peabody was born in Muskingum County, Ohio, in 1837, and entered Phillips Academy April 20, 1854, at the age of sixteen years. He graduated the first man in the Class of 1857 with the Valedictory address at the close of an English oration on the subject "Roman Literature and Arts as affected by Foreign Conquest". His uncle was Mr. George Peabody, the noted philanthropist. Mr. George Peabody was interested in his nephew and attended the Commencement exercises of 1857. Recognizing the worth of Phillips Academy, he established, in 1866, a Chair of Natural Sciences and the Trustees appointed Professor William B. Graves as head of that Department. After Mr. R. S. Peabody had graduated from Harvard, in the Class of '62, he practiced law in Vermont and subsequently took up his residence in Germantown where he afterwards resided.

Among his classmates were Mr. Convers, the founder of the Mathematical prizes in the school, Professor Allen C. Barrows of the Ohio State University at Columbus, Dr. John H. Denison of Williamstown, James B. Hammond of Hammond Typewriter fame, the eminent physician James N. Hyde of Chicago, Ex-Congressman Joseph A. Scranton, and the patriot Frazar A. Stearns who fell at Newbern.

Mr. Peabody spent his boyhood in the valley of the Muskingum and as in that region there are numerous mound-builder and Indian remains, he became interested in archaeology. With his own hands he collected some one or two hundred specimens on his father's farm. When the collection at Phillips was numbered the records properly began with Mr. Peabody's personal finds and No. 1 is an interesting hematite celt.

In 1889 and 1900 Mr. Peabody consulted with Dr. Cecil F. P. Bancroft, Principal of Phillips Academy, and Dr. Thomas Wilson, Curator of Anthropology at the Smithsonian Institution, and the three projected the scheme for the Department. Mr. Peabody died October 1st, 1904. The last four or five years of Mr. Peabody's life he was an invalid and suffered more than falls to the lot of the average man. Yet he bore it all very

patiently, although frequently suffering intense pain. He had a kind word for every one and men who came in personal contact with him were charmed by his delightful manner. He was a fine Latin scholar and because of his legal knowledge he was frequently sought by men of great affairs. In an unostentatious way he did a great deal of good, and the sum and substance of his liberalities will never be known. Modesty was his characteristic trait and he was prompted to keep the splendid donation to Phillips out of the newspapers. Indeed, so far as it was possible, he desired that no one refer to himself and Mrs. Peabody as the founders of the Department.

He was a nature student and for more than twenty-five years spent his summers in the Adirondacks, where he had a cabin at Saranac Inn. Aside from his desire to teach the young something regarding the primitive conditions in America, he wished that the boys in Phillips might have better facilities than those he enjoyed fifty years ago when on the Hill. The present building accomplishes this end, and will always stand as a monument to him

During the years 1896 and 1898 Mr. Peabody took active interest in the collecting of specimens and although frequently confined to his room, he had the boxes as they came opened, and inspected their contents. He was particularly interested in the "gorgets", "ceremonials", and other "problematical" forms and it was his wish that the Director and the Curator devote their spare time during several years to the study of these unknown artifacts.

Mr. Peabody had no desire to found a great museum. He rather had it in mind to establish a "working department" and so expressed himself on numerous occasions. He held that the greater museums emphasized the necessity for explorations of sites, and investigation of living tribes almost to the exclusion of the serious study of material on hand. He thought that there were now sufficient specimens in the museums and private collections of the United States to furnish data for reasonable conclusions.

In the summer of 1890 the Curator was invited to spend some weeks with Mr. Peabody at his cabin (Saranac Inn on Upper Saranac Lake, Adirondacks). During several long conferences

Mr. Peabody outlined with particular detail just what he desired to accomplish when he should establish the Andover Department.

Although Mr. Peabody made no pretensions to archaeological knowledge, yet he was quite well versed in scientific matters. He explained at length why he had instructed the writer to make extensive collections of surface material in Ohio and Kentucky in the previous year and during the winter of 1896–'97. His Department, he said, might or might not carry on explorations in the future. If not, there were always available the results of extensive explorations on the part of other museums. He wished the writer to procure all the local collections possible. That is, of collections well recorded and gathered in a specific area — collections that should illustrate the art of the region. These being surface collections from the village sites and fields, might be found to present differences more or less marked when contrasted with similar specimens from mounds and graves. He believed that the Ohio valley was inhabited for a great length of time. The presence of Flint Ridge material in one locality, of Tennessee nodular flint in another and local chert in a third, might indicate separate tribes or a considerable length of occupation. Furthermore, that the gravel burials might be found to represent a different culture from that of the mounds. He took no stock in the old theory of "general mound builder culture" so far as it related to "high culture", as expressed by some writers. But he did believe that the modern tendency was to swing too far to the other extreme and classify all prehistoric peoples in the Ohio valley as on a plane with the Indian tribes found in the region by the earliest explorers. He requested that the writer make a careful study of the workmanship of flint implements, ceremonial objects, etc., after the Andover collection should become extensive. He hoped that such a study would prove that the art of certain localities could be recognized and that an arrow-head of uniform shape and workmanship did not necessarily imply the same culture or the same time horizons; that in the various localities one would find certain forms of knives, ceremonials, or some other implement characteristic of that tribe or that locality. In such observations, he contended, lay the value of archaeol-

ogy. The things must be studied as the botanist studies his leaves and the sweeping generalization made that flint implements were all more or less alike had no foundation in fact, according to his observations.

The Curator remembers one occasion especially during which the Founder emphasized his views in the course of a conversation lasting most of the night. Mr. Peabody had read, or examined, many of the museum reports and works upon archaeology. These were chiefly a record of facts, he stated. Hundreds of pages were devoted to a recitation of what was found in various mounds, graves, and sites. Thousands of pages chronicled observations upon living tribes. The stone objects, and particularly those denoting the height of stone-age art, in great numbers were now on exhibition in the various museums. It was high time, he said, that some one should devote his life to their study. Such study would lead to a geographical distribution of types and possibly the definite boundaries of certain prehistoric art areas might be determined. He thought that the Department at Andover would be able to avail itself for study of the great accumulations in museums. Mr. Peabody desired that the Department trace the development of forms from the rough to the completed object, and make collections with that end in mind.

The wisdom of his suggestions has been fully appreciated by the Trustees of the Academy and the officers of the Department.

INSTRUCTION IN ARCHAEOLOGICAL STUDIES.

Since the Department was founded some 114 students have taken the course in American Archaeology. Naturally, the course offered is not as technical or comprehensive as similar courses in Yale, University of Chicago, Harvard, or Columbia. But it is sufficiently complete to give young men a pretty fair knowledge regarding stone age man here and abroad. The lectures are frequently illustrated by lantern slides, of which the Department possesses about five hundred. Addresses or formal lectures to the students by archaeologists and ethnologists from the larger museums have been given. Among those who spoke were Professor Putnam, Dr. Farrabee, Professor Morse, Professors Smith and Robinson.

Correspondents in various parts of the United States and Canada have asked for archaeologic information, and more than 3500 letters, containing desired data or advice, have been written by the Curator during the past five years.

Several academy students have procured collections for the Department.

FIG. 4 — WESTERN END OF PUEBLO BONITO

EXPLORATIONS IN NEW MEXICO.

In April, 1897, the writer left Farmington, New Mexico, with nine men, a large wagon, and five horses, bound for the Chaco Group ruins, seventy miles south. This had been partly investigated by Dr. George H. Pepper in the interest of the American Museum of Natural History, New York, and since the date mentioned Dr. Pepper has conducted more extensive explorations.*

It was not the purpose of Mr. Peabody's expedition to attempt a thorough exploration, but simply to make a typical collection in three weeks, and, as a total of about two thousand specimens of various kinds were secured in that time, the object of the visitation was accomplished. For fuller descriptions of the Chaco Group readers are referred to the various articles cited.

For several days the men made careful search of the surface about each ruin and collected a number of large metates, mano stones, arrow points, fragments of pottery, etc. As there was practically no grass in the Chaco region, the teamster was sent back to Farmington for more baled hay, oats, etc, as well as

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* *Ceremonial Deposits Found in an Ancient Pueblo Estufa in Northern New Mexico, U. S. A.* (In the Monumental Records for July, 1899.)

Ceremonial Objects and Ornaments from Pueblo Bonito, New Mexico. (Anthropologist, April–June, 1905.)

The writer is indebted to Dr. Pepper for the following references to the Chaco Bibliography:—

Gregg, Josiah. "*Commerce of the Prairies*", I, 284–285, 1844.

Simpson, J. H. "*Journal of the Military Reconnaissance from Sante Fe, New Mexico, to the Navajo Country.*" Washington, 1850.

Jackson. Wm. H. "*Ruins of the Chaco Canon, Examined in 1877*"; Tenth Rep. Hayden Survey, Pt. III, Washington, 1878.

A number of magazine articles.

Chas. Lummis has written a short article concerning this group. There are scattering descriptions of it in the Government Reports.

Holsinger's manuscript report in the General Land Office in Washington covers the ground in good shape. The title of his article is "*Report on the Prehistoric Ruins of Chaco Canyon, New Mexico.*"

Mentions of some of the articles pertaining to this group found in Hewett's bibliography, in his article entitled "*Historic and Prehistoric Ruins of the Southwest.*"

provisions for the men and empty boxes in which to pack the finds. He took with him five or six hundred pounds of boxed specimens, and in the course of a week returned.

After the expedition had collected such things as could be found on the surface, a small cemetery about a mile from the principal ruin was explored. At a depth of one half to one meter were found a number of skeletons and forty or fifty jars, bowls, etc. Some of these are illustrated in figs. 10, 11, 12, 13 and 15.

The rooms of the first story of Pueblo Bonito, the largest building of the Chaco Group, are quite dark. This is true of all the large pueblos in the San Juan Country, and is due to the falling of walls, the shifting of sands by the winds, and other agencies, thus destroying the upper stories and burying the doorways and air shafts of the lower rooms. The entire party spent two or three days in these underground rooms, climbing from one into another and collecting pottery and other objects. Under the floor of the small room near the northwest corner of Pueblo Bonito was found a splendidly preserved skeleton of a young woman wrapped in a large feather robe, which was originally 1.3 by 2 meters. Some of the pottery accompanying this burial is shown in fig. 13. Unfortunately, of the feather robe nothing remains but the cords on which the feathers were strung. Sandals of both the cloth and fibre kind were collected, as well as some wooden objects and a "throwing stick". In a letter to Mr. Peabody the following paragraphs occur: —

"Just opposite our camp is the largest ruin — Pueblo Bonito. The upper stories have fallen down (it was originally three or four stories in height) and only the ground and second tier of rooms remain. In these rooms I found the fire-places, traces of corn and other foods, wooden implements, mortars, etc. We opened one or two rooms and observed several Kivas, built of stone, five to eight meters in diameter and perhaps four meters deep. In one that had been cleaned out by Dr. Pepper, there was a small walled, circular depression in the centre in which the sacred fire was placed. Around the base of this Kiva were seats on which performers in the ceremonies rested. Climbing down into the dark, underground rooms, over broken rafters, or through passageways, groping by aid of torches and candles, we

FIG. 5 — CEREMONIAL OBJECTS
From a room in Pueblo Bonito

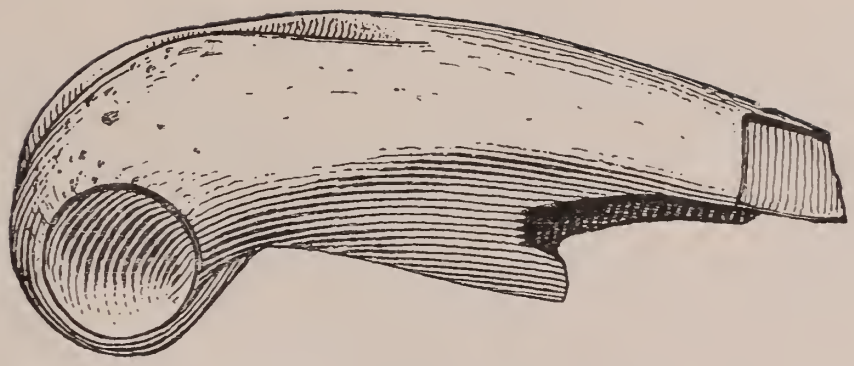

FIG. 6 — BONE SCRAPER

On which Turquoise was to be inlaid

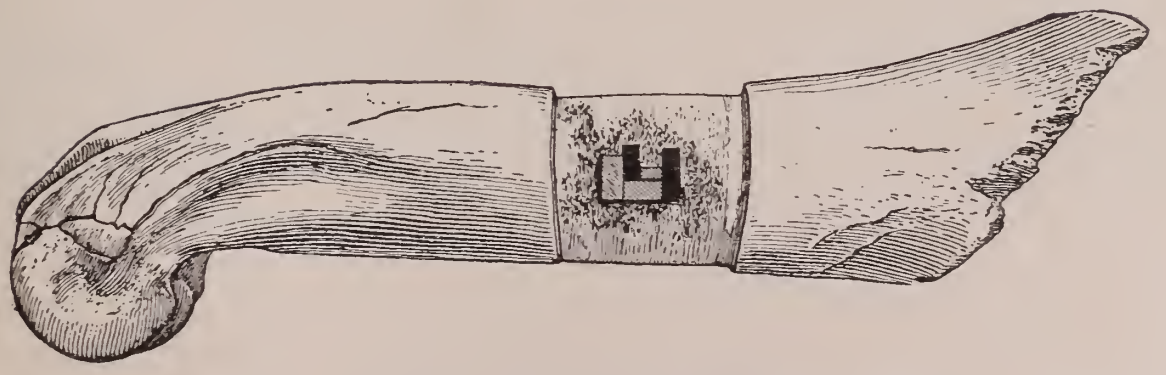

FIG. 7 — BONE SCRAPER

With inlaid work in Jet and Turquoise

found the rooms in which the ancients lived, — rooms in which burials were made.

"There is something fascinating in this 'catacomb' underground work — different from our Ohio explorations — more like that of Egypt. You can better understand the extent of Pueblo Bonito when I tell you that the walls are yet standing in two places eight meters high and fairly well preserved.

"Selecting at random a small room filled with rubbish, the workmen dug it out to a depth of three meters, down to a hard adobe floor. Near the bottom of this room were found three peculiar objects. (See fig. 16.) One is evidently a sandal last; the long stone, a knife or weapon; and the third must remain a mystery. Some one suggested that it formed the base for a post or support. This may or may not be correct. One would suppose that an ordinary flat, smooth stone would serve to hold an ordinary post in place and that a carefully cut square surrounded by a mat or depression would be unnecessary. It is usual to assign to 'problematical stones' a ceremonial significance, and possibly the 'cut square depression' may have served such a purpose."

The sandal last in fig. 16 is typical of similar specimens found in the Cliff Dweller country, according to Dr. J. F. Snyder, who has made a study of sandal lasts. The first published mention of them is found in Baron de Nordenskiold's volume, "The Cliff Dwellers of the Mesa Verde", Stockholm, 1893, p. 99. Dr. Snyder wrote an article for the "Antiquarian" (May, 1897), and, when additional information had been collected, a more exhaustive paper for the "American Archaeologist", (Jan., 1899). Dr. Snyder contended that these sandal lasts were used as bases on which to weave either sandals or small mats. He proves his contention by a study of the specimen shown in fig. 17. This last was of baked clay, and came from a cliff house in Butler Cañon, Utah. A careful examination of the surface revealed a stamped pattern of the sandal fibre which Dr. Snyder has reproduced in fig. 17. He says the rights and lefts were made by the simple expedient of turning the sandal last over. Regarding the interesting discovery, he says that it unlocked the puzzle so far as to demonstrate that the impression was made on smooth clay, "but the motive for

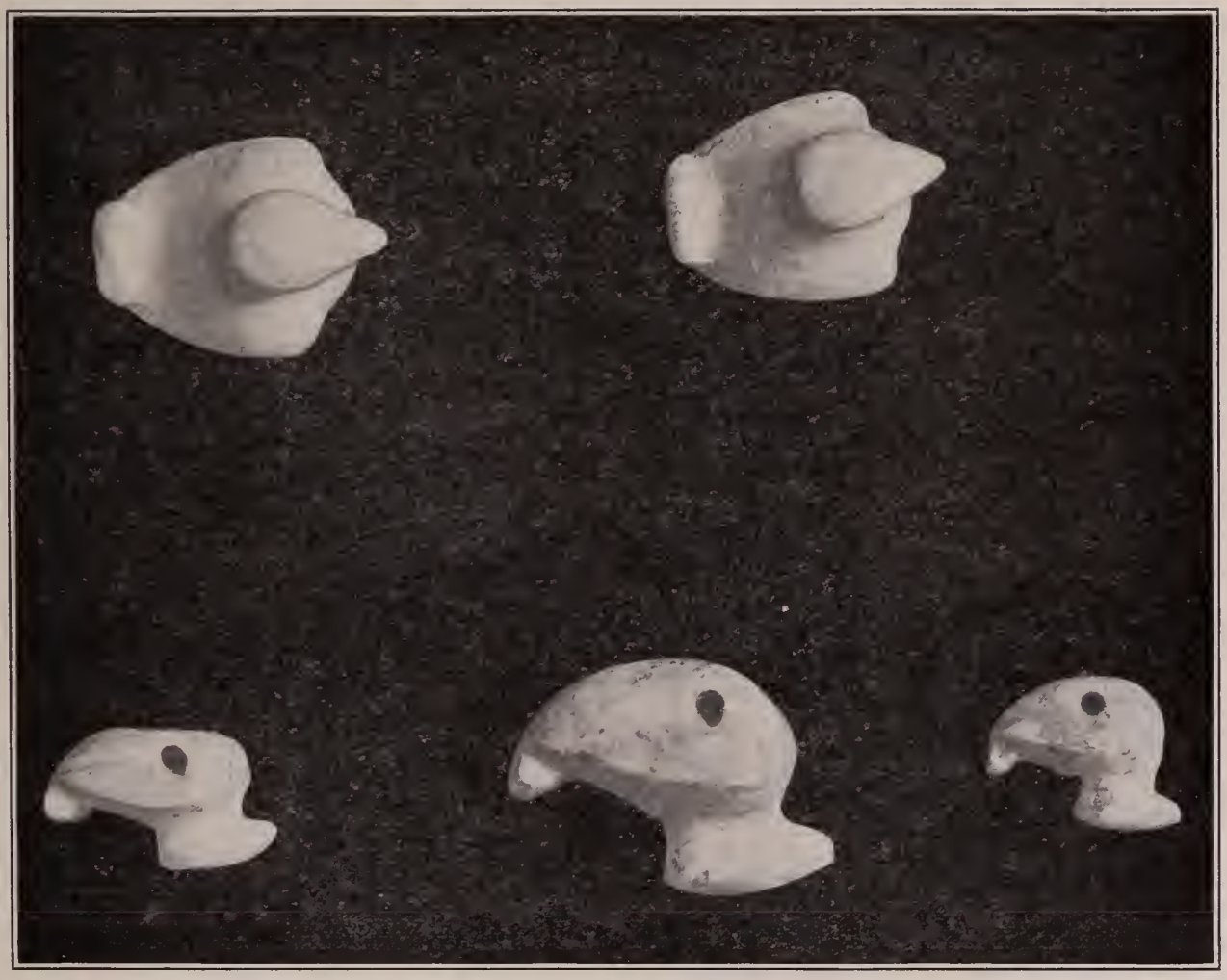

FIG. 8 — TURQUOISE BIRDS

From room 38 in Pueblo Bonito

preserving this stamped copy of the weaver's pattern on the terra cotta model remains yet to be explained, without we accept the conclusion that the object was made for no other purpose than simply to preserve the figure as a guide for weaving others to correspond with it." The clay sandal last is 30 cm. in length and 15 1-2 cm. wide. Regarding fig. 18, which the writer has reproduced from Dr. Snyder's article, Dr. Snyder says: —

"Sandals of various kinds have been found in the cliff dwellings differing in texture, form, and material. A common variety were made of untanned buffalo or elk hide, with the hair intact on the upper surface on which the foot rested. The yucca plant furnished the staple for nearly all the others. Some were coarsely made of twisted shreds of the leaf, and many, of neater structure, were wrought of the split fibres of more or less fineness. The prevailing shape of all, with the exception of those first described, was simply an ovoid, sometimes slightly modified, corresponding with the outlines of the foot only in length and breadth. The peculiarly curved front end with its square offset, of the more finely woven specimens, requiring a stone pattern for their fabrication, may perhaps be interpreted as a development of the esthetic in the progressive culture of those ancient tenants of the cliffs and caves."

In one of the underground rooms was found a double vase or jar of most singular pattern. These two jars were modeled on a wide strip of clay, thus holding them firmly on the same base. They were about 3 1-2 cm. apart at the bottom and top. Nine or 10 cm. from the base on which they rested is another strip of clay joining them again. The top of one jar is slightly broken; the other is broken half way between the base and the mouth. There are two perforations in the slightly broken jar near the top, for repair or for insertion of cords in order to suspend the vessel. The jars are painted with characteristic zigzag lines (lightning?), common on the Chaco pottery. Their height is about 27 cm.; length of base 23 cm.; diameter of top of one jar 11.5 cm.

The Chaco group of ruins, comprising some fifteen buildiugs, scattered over an area of three or four miles, furnishes oppor

tunity for unlimited exploration. The sites should be preserved by the national government.

There is every evidence of a numerous population for generations. Roughly comparing the buildings with those of modern or inhabited pueblos, the writer estimates that at least 10,000 people lived in the Chaco Group at one time. There is no group of ruins in the United States to compare with these. For miles along Chaco Cañon and upon the bluffs as well, the surface is thickly strewn with pottery fragments and other evidences of human occupation. Well worn trails ascend the bluffs at numerous points, and opposite Pueblo Bonito the trail is worn deep into the rock. The culture is clearly pre-Columbian.

Dr. Pepper published in the "Anthropologist" for April–June, 1905, a paper entitled "Ceremonial Objects and Ornaments from Pueblo Bonito, New Mexico". Dr. Pepper kindly permitted the Department to republish his description of certain interesting objects found by him, and loaned for use in this BULLETIN, figs. 4, 5, 6, 7, 8, and 9. The museum at Andover has none of the turquoise birds or inlaid scrapers in its collections, but quite a number of turquoise beads or small pendants were found at the Chaco group and in the Salado valley, and are in the Department's exhibits.

It will be observed that portions of Dr. Pepper's text are omitted. Some of the sentences are not taken literally from his report, although the substance is practically the same.

Fig. 4 shows the western end of Pueblo Bonito. "The room" (in the foreground) was found, on examination, to be "filled with debris consisting of sandstone slabs from the fallen walls, decaying ceiling beams, and the adobe floors of upper rooms with whatever objects were on them when they gradually weakened and finally collapsed. On this account many objects of scientific interest were broken or scattered through the debris." Work in this room "brought to light an interesting collection of material, the greater part of which was of ceremonial character, or at least might have been used in sacred observances."

In the western part of the room an object of bone was found, "and investigation showed that it was inlaid with turquoise and

FIG. 9 — TURQUOISE PENDANTS

From room 38 in Pueblo Bonito

FIG. 10 — DOUBLE JAR FROM THE CHACO

S. 1–4

jet. The extremities of the bone had been shattered, but the mosaic had not been injured in the excavation." This specimen "proved to be of the so-called scraper form. Directly south and almost touching this scraper was another of similar shape and size."

These and other objects are shown in fig. 5. The following specimens were found near by: two turquoise pendants and a large slab of jet, not shown in the photograph; No. 1, a bird form of decomposed turquoise; No. 2, also a bird form; No. 3, a turquoise pendant; No. 4, a third bird form; No. 5, another turquoise bird; No. 6, tail portion only of a bird of turquoise; Nos. 7 and 8, beads of jet.

"Bone implements of the type represented in the accompanying photograph (fig. 5) are found throughout the ancient Pueblo region of the Southwest. * * * The bone scrapers from Pueblo Bonito were rarely decorated; but when ornamentation occurred, it was generally in the form of incised designs, such as cross-hatching, meanders, and animal forms."

One specimen, fig. 6, "was found in a fragmentary condition, but there are evidences that it had been prepared for the reception of an inlay. * * * In preparing the bone for the reception of the inlay, the usual method was no doubt employed. A groove was cut with a stone knife in one side of the humerus, and the cut extended until it encircled the bone. This process was continued until the bone could be broken apart. The cutting away of the under side was the next step. This was accomplished by grinding, and the final touches to the edges were given with a polishing stone. In scrapers designed for everyday use, no further work was done.

"Scraper No. 10 (in fig. 5) when found, five of the tesserae, three of turquoise and two of jet, were in place. From their position and general arrangement it would seem that the design had been in the form of a half-meander or an interlocking fret. Beneath the scraper were found nine jet and twenty-seven turquoise tesserae.

"This scraper is 15 cm. 5 mm. long, and is in perfect condition. The groove that held the mosaic is 2 cm. 6 mm. wide, and averages 2 mm. in depth. The loss of the design is compensated by the fact that we have been enabled to observe the

FIG. 11 — THREE TYPICAL BOWLS

From the Chaco Group of Ruins, Northern New Mexico S. about 1–3

FIG. 12 — THREE CHACO BOWLS

S. about 1–3

finish of the bottom of the cut which was left rough in order that the piñon gum might the more firmly adhere.

"Of the five bird forms found in Room 38, four were perfect, and the fifth was represented by several fragments, the largest being the tail end, fig. 8. These birds are cut from decomposed turquoise, and in color are pale bluish green. There is practically no variation in the eight specimens of the type found in Pueblo Bonito. The material from which the birds are carved is so soft that it can be cut with a knife. The figures were probably roughed out with one of the many forms of stone implements, and then ground to the desired shape with sandstone grinders. On the surface of some of the birds may be seen fine lines, which, under a glass of low power, have the appearance of file scratches; they are nevertheless the marking made by the sandstone polishers. Lines of this character are in evidence on many of the stone implements found in this region, and are especially noticeable on objects of wood.

"Over the surface of each of these five turquoise specimens there is a dull red patina. There are evidences of the matrix in some pieces, but the surface color seems to be due to soil discoloration. In the other three bird forms found in this ruin by the Navaho workmen, there are indications of this discoloration, but the greater part of it had been removed by carrying the objects about in their medicine bags, or in using them as pendants on their necklaces. The head, tail, and wings of the birds are indicated in each instance. The variety represented is doubtless a water fowl, probably the duck, the poise of the head and the general angle of the body suggesting the appearance of a duck when resting on water. This form of bird seems to have been a favorite one with the sedentary people of the Southwest. From Pueblo Bonito alone it is carved from red hematite and stone, and in some Chaco ruins it has been found carved from pure turquoise, shell, and jet. In southeastern Utah, in the Grand Gulch region, some of the large basketry meal trays have a line of these bird figures as a decorative element; and in one of them the design is associated with the butterfly.* The largest bird (No. 2) is 2 cm. 7 mm. long, and 2 cm. 1 mm.

*Geo. H. Pepper, *The Ancient Basket Makers of Southeastern Utah*, pp. 13, 15.

FIG. 13 — FOUR TYPICAL CHACO PITCHERS

S. about 1–4

wide. The smallest (No. 1) is 1 cm. 7 mm. long, and 1 cm. 3 mm. wide. These measurements do not include the projecting beaks, which vary in size in the different pieces, all of them being proportionate to the size of the body. The tails and wings are carved in relief, and all the specimens have lateral perforations below the front or shoulder portion of the wings. The position of the holes causes a top-heaviness when the birds hang free, but against the body they maintain the proper angle, hanging with the head upward.

"There were fifteen turquoise pendants associated with the larger objects herein described (fig. 9). Two of these are quite large, but the others are of medium size. The largest, No. 3, may be seen near the turquoise bird No. 2 (fig. 5), on a slight elevation northeast of the scrapers. It is 3 cm. 4 mm. long, with a width of 2 cm. at the top, and 2 cm. 5 mm. at the bottom, tapering gradually to the rounded base In color it is delicate blue. The polished surface shows an interlacing of matrix lines, and the back, with the exception of a very small space in the upper right-hand corner, is a layer of brown trachyte — the rock in which the turquoise is found. The pendant has a thickness of 5 mm.; the edges have been smoothed and polished, and there is a perforation in the upper part. The drilling in this specimen, which is at an angle, with the larger opening on the turquoise side, is the most irregular that has been found in the turquoise work from Pueblo Bonito. The most remarkable feature of the specimen is its color, which is very light as compared with the other specimens from this room, whose prevailing shades range from dark blue to dull olive green. The light blue seen in the turquoise of commerce is seldom found.

"Of the remaining fourteen pendants the largest is 3 cm. 1 mm. long, and the smallest 9 mm. They vary in shape and thickness, but are typical of the forms found in the various rooms of Pueblo Bonito, as indeed throughout this entire culture area. Other objects of turquoise were 106 flat circular beads and one small tessera. The beads ranged from 3 mm. to 6 mm. in diameter, and averaged 1.5 mm. in thickness."

As our stay was brief, we made no remarkable discoveries. But Pepper's expedition was able to carry on continuous work

FIG. 14 — A LARGE BOWL

From ruins along the San Juan river S. 3–5

for months, and on one occasion found hundreds of turquoise objects hidden in one of the Kivas. This rich field awaits future explorers.

Archaeologists will rejoice if Dr. Pepper is able to resume the explorations of this remarkable place and carry them to a successful termination. Having begun his work under such auspicious circumstances, it is to be hoped that he will continue. The Chaco Group is the most important in the United States, and there is abundant evidence that the culture of the whole Southwest reached its zenith there.

The party returned from the Chaco Group to Farmington, and the specimens were packed ready for shipment to Mr. Peabody. We visited the Salmon ruins on the San Juan river, about 20 miles from Farmington, finding there two small buildings that had been destroyed by fire. Mr. Salmon did not wish us to carry on explorations for greater length of time than three days, and we were unable to secure more than a few specimens. The site is interesting and merits thorough exploration. Such whole pottery as we obtained from this San Juan pueblo is as finely made as any found in the Southwest. Apparently, the pueblo was attacked, sacked, and burned while it was still occupied. By whom, may be determined after careful exploration.

The La Plata valley was visited and a few specimens collected from Boulder ruins along that stream and the San Juan. A survey under the direction of the writer in 1892 had pretty thoroughly examined the lower San Juan region. En route to Durango several collections were purchased from ranchmen at La Plata, Farmington, and Olio, New Mexico.

EXPLORATIONS AT THE MOUTH OF THE WABASH.

About August 1st, 1897, Mr. Peabody instructed the writer to proceed down the Ohio river from Cincinnati and examine various sites, mounds, and other remains, as far as the Mississippi. The services of Mr. Clifford Anderson, of Fort Ancient, Ohio, were procured, and he continued working for Mr. Peabody practically all of his time for the next three years. Anderson had served the writer faithfully on the Ft. Ancient, Hopewell, Oregonia, and other surveys, and was not only a careful and intelligent field man but seemed to know by intuition the most likely places for explorations.

Previous to the Ohio River trip, more Scioto valley specimens were obtained. Scioto types exhibit as high stone age art as have been found in the entire Mississippi valley.

The writer called upon many farmers in Ross and Pickaway counties in Ohio, and secured several hundred interesting specimens. In a gravel pit east of Circleville, while workmen were removing material to be placed upon the roads, fifteen or twenty skeletons were found one to one and a half meters below the crest of the gravel knoll. Among the ribs of one of these bodies was found a hematite plummet. Near the head of another skeleton was a bone knife handle and a tubular pipe. An ordinary flint knife lay near the bone handle, and originally may have been fastened to it.

Two mounds near Waynesville, Ohio, were on the high terrace overlooking the Little Miami river ten miles above Fort Ancient. Both mounds were promising, but the exploration of each was a disappointment. Burnet mound was about five hundred yards north of the river. It is two meters in height and about 30 by 20 meters in diameter. An ash pit, two cremated skeletons, and three decayed skeletons were observed. The only relic discovered was a flint knife. The Mason mound is half a mile farther up the river, one and a half meters high and twenty-five meters in diameter, circular and surrounded by a circular embankment. The circle is forty-two meters in diameter, and the inner trench, or moat, is very deep—perhaps two

Fig. 15 — A PITCHER AND DOUBLE JAR FROM THE CHACO
S. about 2–5

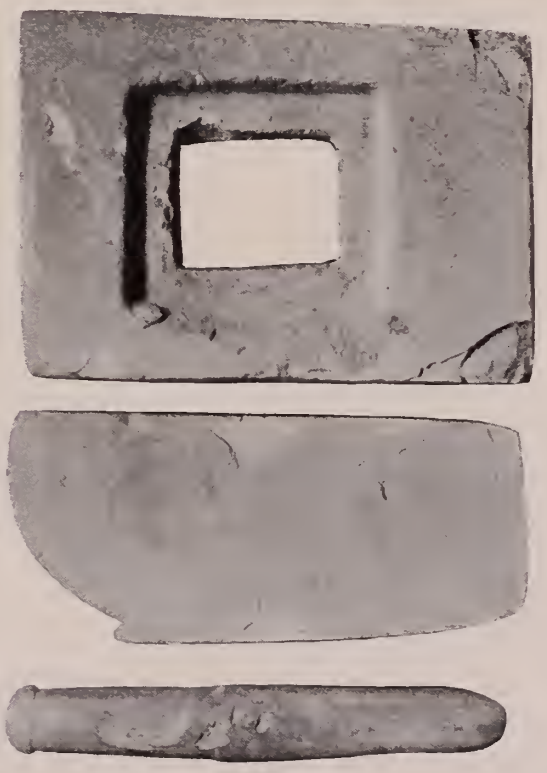

Fig. 16 — A STONE WITH SQUARE HOLE, (for unknown purpose)
A SANDAL LAST, AND A STONE SWORD FROM
THE CHACO S. about 1–6

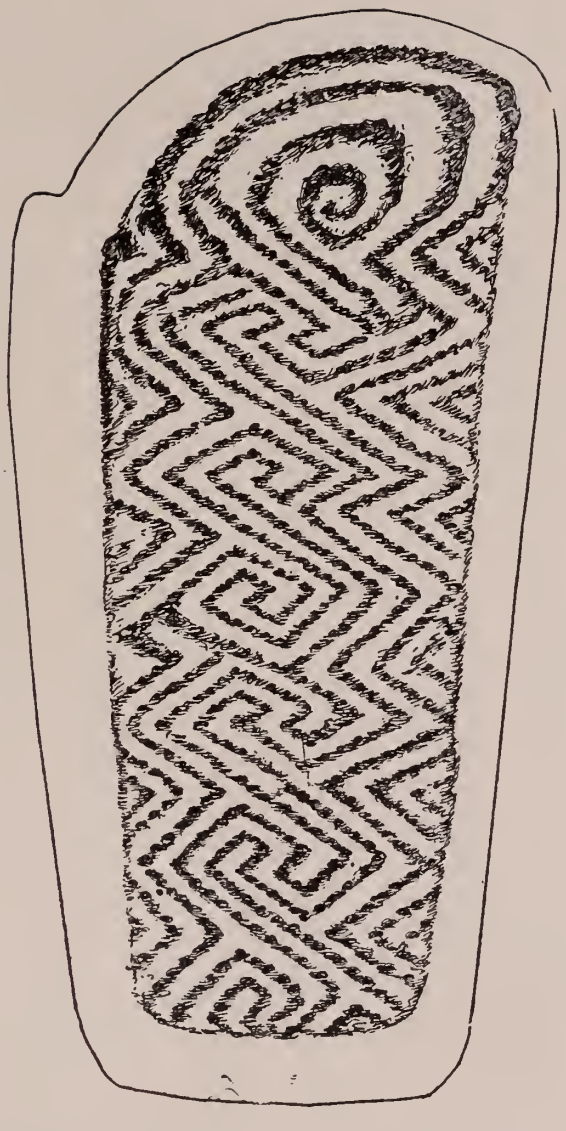

FIG. 17 — CLAY SANDAL LAST, BUTLER CANON, UTAH
S. 1–3

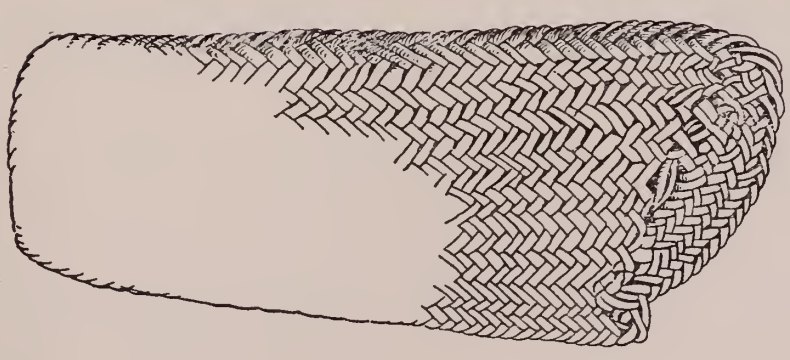

FIG. 18 — SHOWING HOW THE SANDAL WAS PLAITED OVER THE LAST S. 1–4

meters. Both are splendidly preserved. The owner would not permit the mound to be thoroughly explored, but said that we might sink several shafts, which revealed nothing beyond a large bed of ashes and masses of burnt clay. We found a pestle in the edge of the embankment, but that find has no connection with the burial proper, and the pestle was undoubtedly lost or dropped by some passing native. The earth was thrown back, and both mounds were left in practically the original condition.

Barren mounds are rare in the Ohio valley.

During August, 1898, we located at Oregonia, and examined the village site at the mouth of Caesar's creek on the farm of Mr. Hiram Taylor. This is in Warren County, Ohio, five miles north of Fort Ancient. On Mr. Taylor's farm the expedition from the World's Columbian Exposition in 1891, under the writer's direction, opened upwards of 120 stone graves. The finds were typical of the Fort Ancient region.

About August 10th we proceded down the Ohio river from the mouth of the Great Miami to Lawrenceburg and Aurora, Indiana. There were numerous collections in the neighborhood, and most of these were purchased. Five miles up Loughery creek (west from Aurora) is a large village site. Numerous excavations were made, but we were unable to locate the refuse pits and lodge circles. Some future expedition will find these, no doubt. From thence the survey moved to Holmes mound, three miles down the Ohio river from Aurora. This is a part of the largest village site ever observed by the writer in any section of America. While the culture seems to have been low, yet the abundance of surface material would indicate that the village extended for five or six miles along the north bank of the Ohio river, or that there were several villages here located at different times.

The banks of the Ohio river from the mouth of the Kanawa in West Virginia to the Mississippi at Cairo, Illinois, exhibit traces of prehistoric village sites every few miles. On both the Ohio and Kentucky sides at the mouths of the Scioto, Licking, Muskingum, Little and Great Miami, and a score of other streams the sites appear to be of great extent. On the Kentucky side above Portsmouth, Ohio, great quantities of bone implements have been found and it appears to the writer that

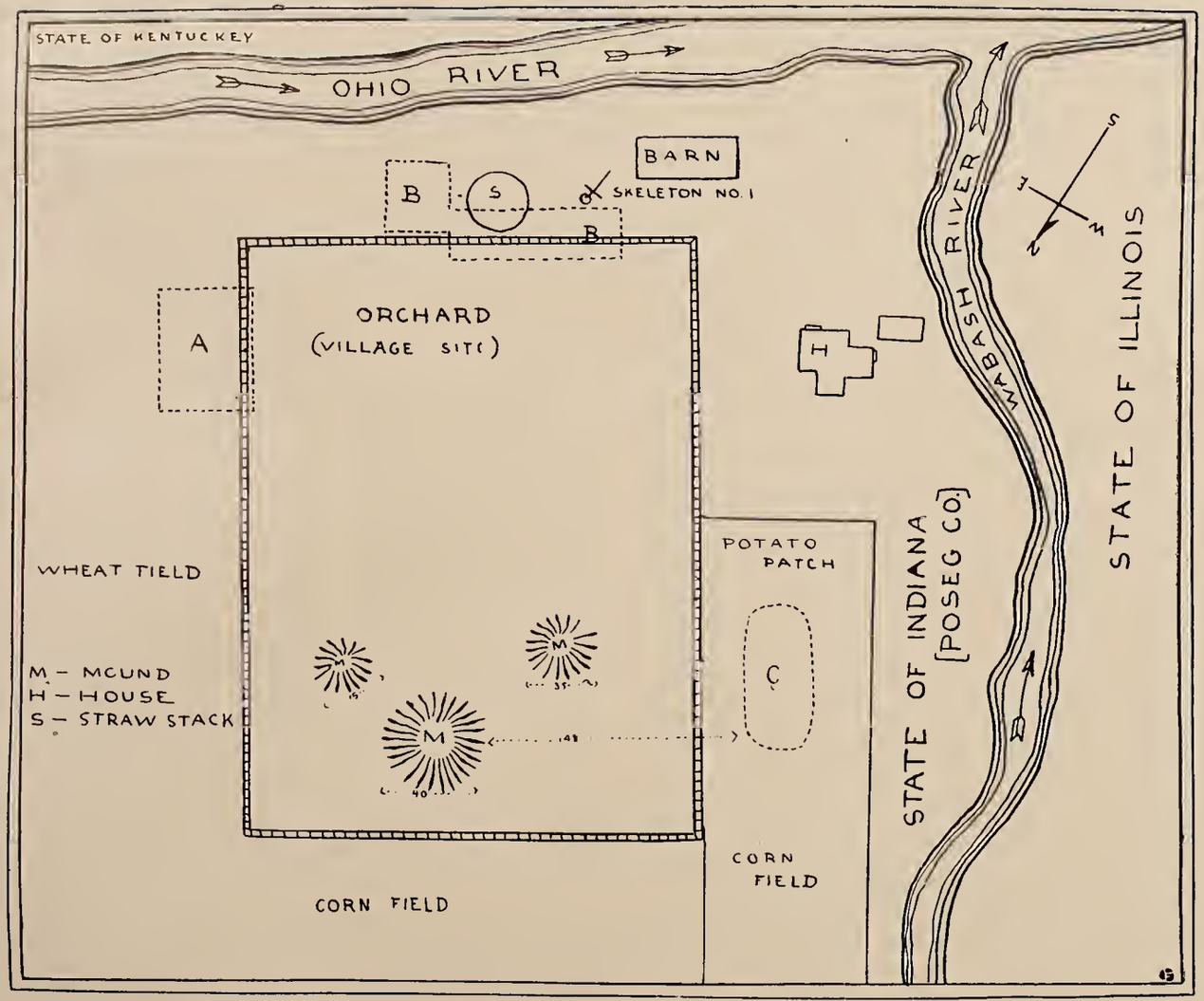

FIG. 19 — PLAN OF VILLAGE AND CEMETERY AT MOUTH OF THE WABASH

EXPLANATION OF THE MAP. FIGURE 19.

When Anderson was at Uniontown, Kentucky, he learned from a store keeper that a tenant had dug up a number of skeletons on the Sullivan farm. Anderson says, "I began prospecting in the orchard (there was much village site debris on the surface) and found a small cemetery (A). This was about 15 m. square. There were four layers of burials, those nearest the surface being about one-third of a meter deep. In the next layer some of the skulls and vessels were crushed, probably by the weight of the horses used in plowing. The pottery and the skeletons in the third and fourth layers were in good condition.

"I do not think that the natives buried deeper than one and one-half meters. Most of the graves were half that deep. It seemed to me that all of the skeletons were those of women and children, at least many of the skeletons were children or babies according to size.

"At the point B-B on the map, I found skeletons of adults with pipes, flint implements, copper ornaments, and a few vessels of pottery. The copper spiral rings were about the neck and shoulders, and were probably used to twist around strands of hair. This cemetery was about 5 m. wide and 50 m. long. I was not permitted to dig under the straw stacks."

In the potato patch he found cemetery C, where there were fragmentary skeletons and broken vessels of pottery. These burials were near the surface. He considered B-B the principal cemetery.

A thorough exploration of the site might result in finding other burials, although Anderson claims to have sunk many experimental shafts in the orchard and elsewhere. The scale is purposely exaggerated in this map, the orchard being out of proportion to the distance from the house to the Ohio and Wabash rivers. The land lying between these rivers and the house and the barn is exceedingly low, subject to overflow, and it is likely that natives did not live there.

Error — Poseg Co. should be Posey Co.

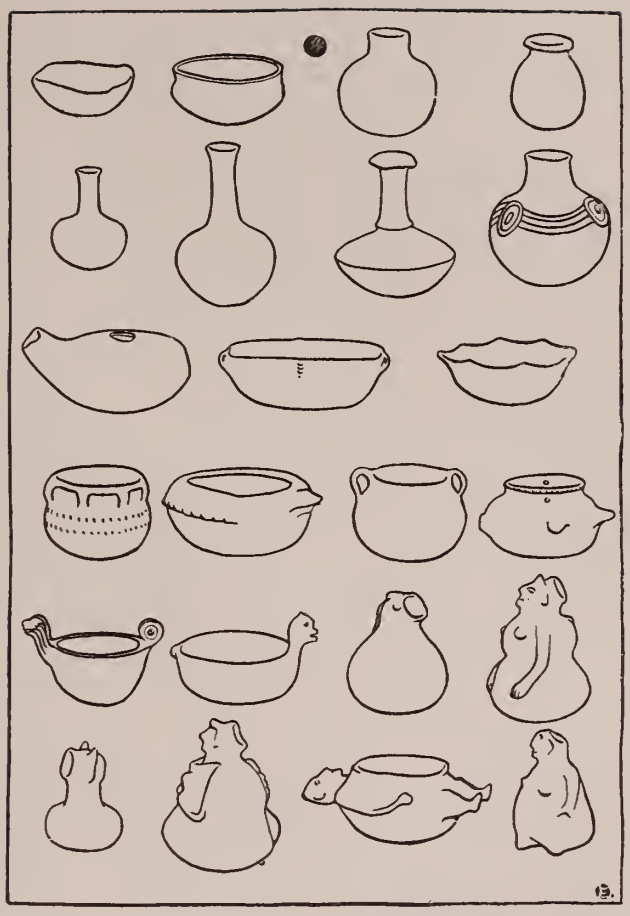

FIG. 20 — GROUP OF POTTERY

From the cemetery at the mouth of the Wabash river, Indiana S. about 1–15

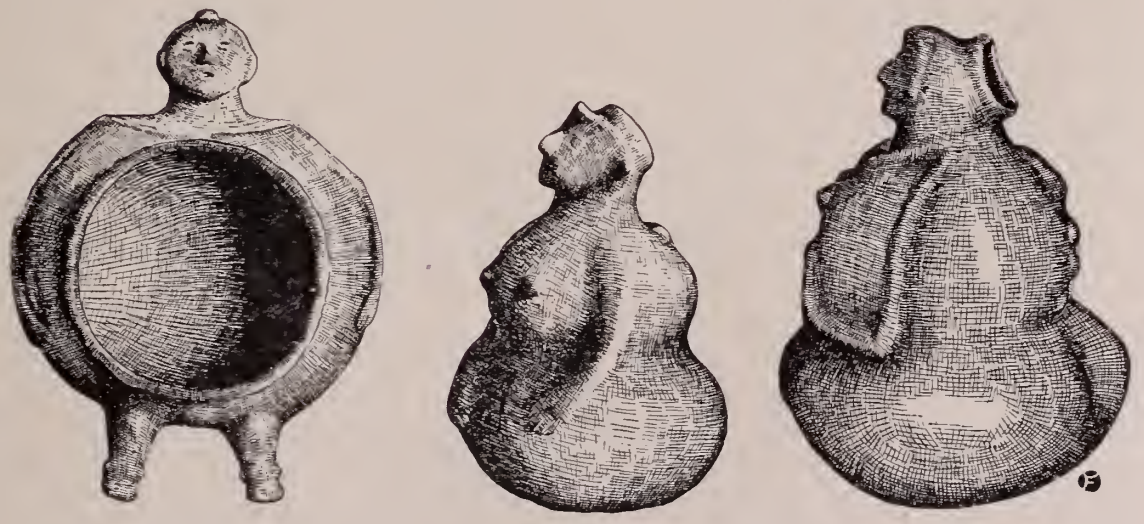

FIG. 21 — THREE EFFIGY BOWLS

From the Wabash cemetery S. 1–5

there is an interesting field for future exploration. These village sites are not necessarily extensive where the great earthworks are located. The earthworks in the Ohio valley have attracted more attention on the part of scientists than the village sites and it is only in the last decade that these have been explored.

From above Lawrenceburg to two or three miles of Aurora, Indiana, there is an almost continuous village site, the ground being covered with broken stones, pieces of pottery, mussel shells, etc. During ten. days' work we found and purchased a collection of more than 3700 specimens. Three or four small mounds were opened and some plain bowls, one or two pipes and skeletons were found. The village sites certainly merit a thorough exploration. The workmanship is crude, the natives seem to have left no artistic objects. Between Lawrenceburg and Aurora the banks were apparently occupied by large numbers of natives who spent their time in hunting and fishing. Some Flint Ridge flint was discovered although many of the knives, spear points, etc., were made of nodular flint from Tennessee or Indiana. Local chert was chiefly employed. Stone celts are very common. Nearly a thousand of all kinds were obtained.

There were six mounds on the high terrace, within a third of a mile of the Ohio river. Three of these we were permitted to open; the others the owners wished to preserve. Number two was two meters high and thirty four meters in diameter and contained seven skeletons. None of these were well preserved and there was no regularity with reference to position or depth. With two of the skeletons were found two crude bowls, more northern than southern in type. There was some Flint Ridge material upon the surface. Both these facts are important and should be carefully noted.

These mounds are of the type common in the Ohio valley, south of the state of Ohio. The exploration of a large number of them would probably be of little consequence to science, as they appeared to be burial mounds pure and simple, each more or less different from another in detail and none of them represented any new facts, save that the Southern culture did not ex

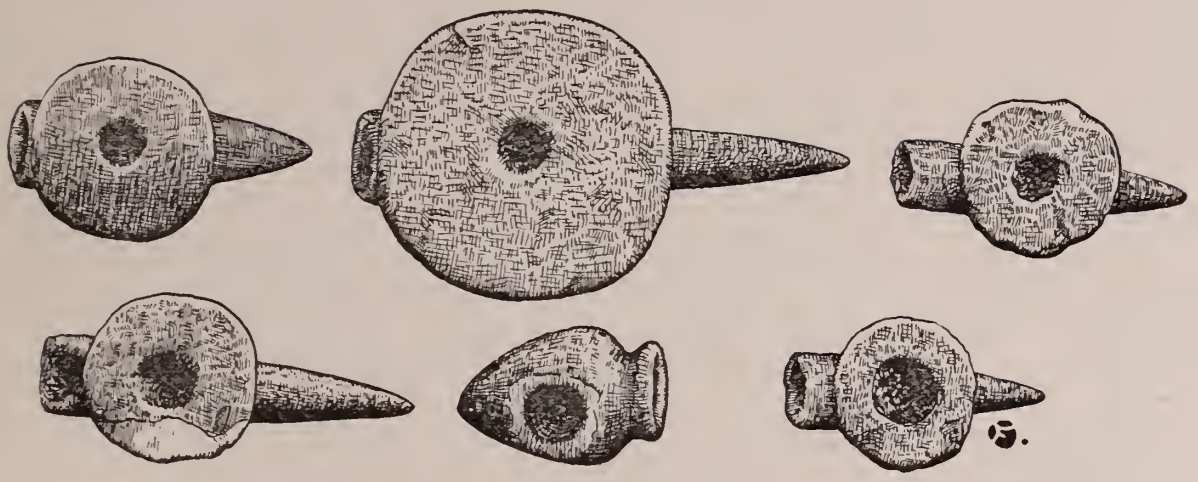

FIG. 22 — PECULIAR PIPES

From the cemetery on the Wabash S. about 1–2

FIG. 23 — COPPER AND STONE PENDANTS

From cemetery at the mouth of the Wabash S. 1–2

a and b—Wooden object covered with a thin sheet of copper.
c and h—Copper spirals.
f—Small copper finger band (?).
d—Ornament of cave gypsum.
e—Small ear drop of stone.
g—Amethyst bead or earring.

tend to them, or that they were built either before or after that epoch.

August 21st. after ten days about Aurora and Lawrenceburg, we went to Patriot, Indiana, but found nothing of consequence. At Uniontown some graves and a village site at the edge of the town were opened. Although several skeletons were exhumed, nothing worthy of note was discovered.

From Uniontown we visited Rising Sun, Indiana, and the Big Bone Springs in Kentucky. The swamp (also known as "Bone Lick") is extensive and its waters were supposed to possess curative properties. In the ante-bellum days a group of hotels sprung up about the resort.

Numerous large bones and one mastodon skeleton have been taken from the swamp. In spite of specious pleas, permission to explore was refused us. Mr. Peabody desired to have the swamp examined in order that he might obtain a mastodon skeleton and ascertain if there were any implements due to human agency among the bones of the extinct mammals. The owner, a venerable gentleman, in refusing us, justified his objections on rather peculiar grounds. The writer had heard many excuses given as to why owners did not care to allow explorations; but never for the reasons named in this case. He said that the Almighty had placed those monsters in the swamp for some special purpose and he, the owner, being a very religious man, would not have them disturbed.

Returning from the Bone Springs to the Ohio river, the writer instructed Anderson to proceed to the mouth of the Wabash. Anderson first tried the Kentucky side of the river but found nothing of consequence. Then he settled for the autumn on the Sullivan farm, Posey County, Indiana, near the mouth of the Wabash, on the east bank. The writer's health compelled him to abandon the field, and he returned to Columbus.

In fig. 19 a plan of the village site is presented. During two months spent in excavating, Mr. Anderson exhumed 157 skeletons. These varied in depth from one half to one and a half meters beneath the surface. It was observed that the bodies were all buried extended, the arms usually straightened at the sides. No regularity was observed with regard to the points of the compass although possibly more skeletons lay with the head

FIG. 24 — LARGE RUIN AT MESA, ARIZONA

This appears to be the highest and longest single ruin in the South-West

to the north than in other directions. It is interesting to note that nearly all of the pottery was placed either on the left side of the head, at the shoulder, or behind the head. This may or may not carry significance. It seems likely, however, that such uniformity of position of the bowls, jars and bottles would not be observed unless the natives had some special idea in view. It must be remembered that in the smoking ceremony the pipe is usually received from the left. In many of the bowls there were mussel shells, frequently cut and trimmed. Apparently, these served as spoons and ladles.

Occasionally skeletons were buried across each other. At first it was thought that two or three had been placed in the same grave but later it became apparent that the first skeleton was buried at considerable depth. Subsequently another grave was dug at right angles to the first and a second (and sometimes even a third) interment was made on the same spot. What time elapsed between the interments it is impossible to determine.

Figs. 20, 21, 22 and 23 present the pottery, beads and copper objects, found in these graves.

There is pathetic interest in the fact that many children skeletons were found during the course of the explorations. The mothers placed alongside the little bodies clay toys, such as rattles, miniature dishes, bowls and bottles. These served the same purpose in ancient times as do the toy dishes and playthings used by our children. There were also pendants, small shells, shell discs and other ornaments buried by the head or at the wrists of these infants and children.

The toy dishes are crudely made, some of them not even baked. Often small, waterworn pebbles had been placed within the toys.

The Wabash cemetery is peculiar and interesting in that it marks the farthest extension north of the southern ceramic art. The types are those of Arkansas, Missouri and Tennessee. As the village site on the west bank of the Wabash appears to have been extensive, it is probable that the natives crossed to the east bank and there resided. But there are no indications as yet discovered of a farther extension up the Ohio river. Certainly at Lawrenceburg and Aurora the types are *northern* and not

southern in character. It is quite evident, therefore, that the Wabash marks an important dividing line between the North and the South. If future explorations should prove that southern pottery is found in any considerable numbers north or east of the Wabash, the writer's statement made above is an error, but up to the present at least, no such indications are apparent. The natives may have ascended the Wabash itself for some distance. An aged steamboat captain told Anderson that many years ago a large village site and burial ground was exposed ten or twelve miles above the mouth of the river by a spring freshet. The writer is unaware of any reference in archaeologic literature, to the site referred to by the captain.

Copper found in the graves is in the form of spool shaped ornaments, spirals and beads. All of them are small or thin and much oxidized, therefore it is impossible to state positively whether they are prehistoric or of European origin. But the copper appears to be ancient. No Flint Ridge material was found in this site and projectile points, etc., of nodular flint predominated. The ears of two or three of the effigies are perforated for insertion of earrings.

A few cemeteries have been completely explored, yet this cemetery is manifestly southern and the graves are more or less repetitions of the same story. Several hundred such sites have been known, particularly around Nashville, Tennessee, where thousands of graves have been opened. The same is true of Memphis and of certain localities in Arkansas. The population must have been considerable. The position of a skeleton and the accompanying objects may or may not signify something special. In order to present all the facts, Anderson's detailed report on each burial is inserted at this place.

During September, October and November the writer directed Anderson's operations by correspondence, received the various specimens he had found, cleaned them and shipped them to Mr. Peabody. The latter part of November, 1897, the writer and his family located in Phoenix, Arizona, where they remained until June, 1898.

It will be observed, by those interested in archaeology, that this record emphasizes several points.

FIG. 25 — BOWL

From a cliff house up the Verde river, Arizona S. 1–2

FIG. 26 — SKELETON AND BOWL

From the Kalfus ruin west of Phoenix, Arizona

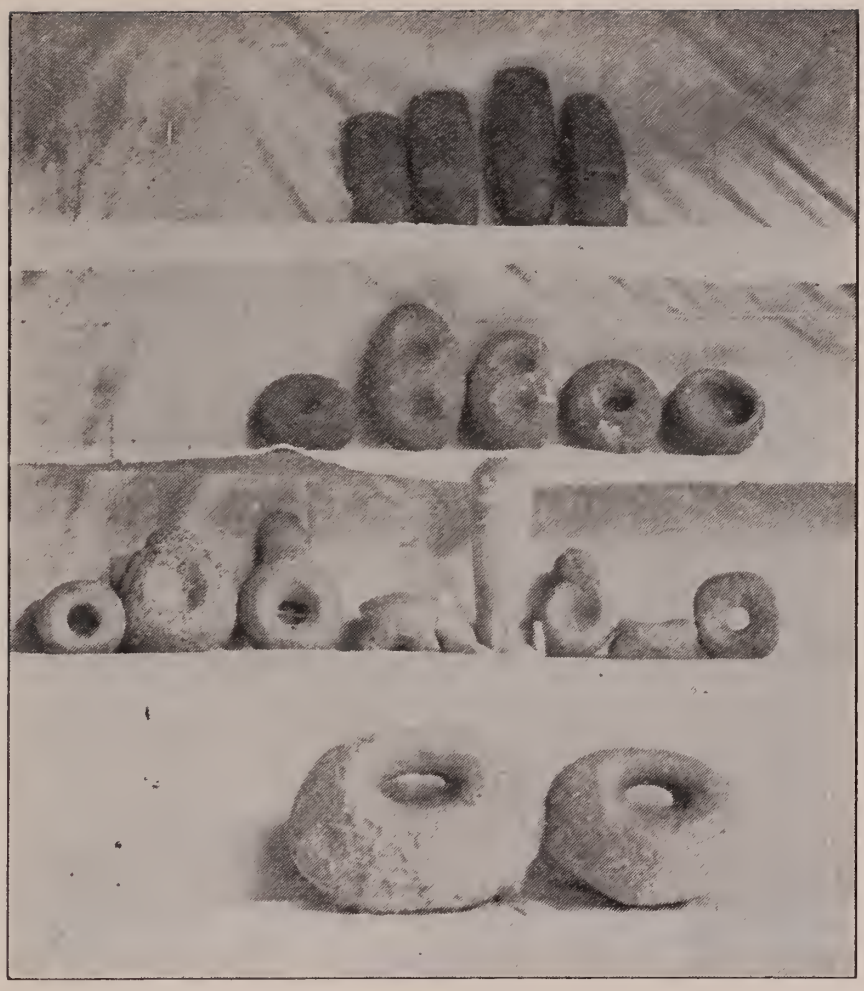

FIG. 27 — GROUP OF OBJECTS FROM THE SALADO VALLEY RUINS S. 1–7

a—Axes.
b—Small mortars and "rings".
c—Rings and "unknown forms".
d—For preparing potters' clay (?).

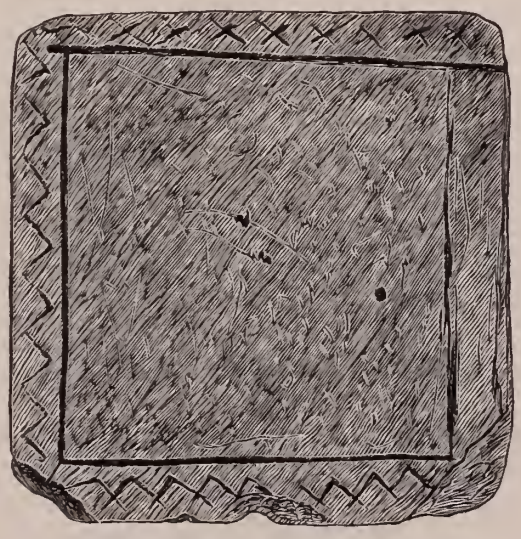

FIG. 28 — SLATE TABLET FROM THE KALFUS RUIN S. 1–2

Other slate tablets are larger and smaller, but with depressed centers. Cushing said that on these ceremonial paint was mixed.

FIG. 29 — PERFORATED STONE DISC

Ruin near Mesa S. 1–2

Many of these are found.

An extended reference to them was published in the *American Anthropologist*, April, 1889. Mr. Lorimer Fisson had observed their use among the natives of New Britain (in Melanesia). There the native men made use of it as a head to a war club. The Australian women used it to weight a digging-stick, but when the village was attacked, employed it as an effective weapon. The grooved-perforated stones were "fixed on the handle with the grooved side undermost, and this groove is filled up with gum in which is set, for ornament, I suppose, a circlet of small shell-tips, which, threaded on a string, are the money currency of New Britain."

FIG. 30 — PERFORATED POTTERY DISC

Ruin south of Phoenix S. 1–1

First. There is no preference as to how the burial "heads' with reference to cardinal points.

Second. Pottery is usually back of the head. This may carry significance.

Third. Objects not regarded as pottery, although cup-shaped, are buried at the wrist or shoulder.

Fourth. That there were several deposits of detached crania with lower jaws missing. (Between numbers 62 and 76.

The field notes are left just as Anderson wrote them — abbreviations and all.

Sept. 1st., I made out my report and answered Mr. Moorehead's letter. Procured packing material and went over to the Sullivan farm in Posey Co., Ind., near the mouth of the Wabash. That afternoon and next morning my prospect holes brought nothing to light.

In the afternoon I looked over the site and observed that a ditch surrounded the village site. I found large fragments of pottery upon the surface indicating pots as large as medium sized wash tubs. I began to work upon the edge of the moat or ditch and excavated about 3 feet in depth, carrying the trench straight ahead.

Skeleton No. 14, headed south, child. No relics.

Skeleton No. 15, directly below the child, headed east. Water bottle made to represent a woman at the right shoulder. Broken bowl at the left of the head.

No. 16, headed west, nothing.

No. 17, headed west, effigy bowl at left of head.

No. 18, headed west, small pot at right elbow, water bottle at left of head.

No. 19, headed east, nothing.

No. 20, headed west, water bottle at left of head. Small bowl behind head.

No. 21, child's skeleton, 28 bone beads around the neck.

No. 22, headed east. Pot at left of head with squirrel bones in it. Small pot near right arm.

No. 23, headed west, nothing.

No. 24, headed east, nothing.

No. 25, headed east, octagon bowl and small pot behind head.

FIG. 31 — EFFIGY OF AN OWL

From large ruin near Mesa S. 1–2

No. 26, headed west, 2 badly broken bowls behind head and one at left shoulder.

No. 27, headed west, effigy bowl and pot behind head.

No. 28, headed west, 1 small broken bowl, 1 broken effigy bowl, 1 water bottle broken, behind head.

No. 29, headed east, 2 plain bowls behind head, 1 effigy bowl at left shoulder.

No. 30 headed west, 1 effigy bowl at left of head, water bowl at right of shoulder.

No. 31, headed east, effigy bowl and scalloped bowl behind head.

No. 32, headed east, water bottle at right shoulder and pot behind head.

No. 33, headed west, small bowl behind head and water bottle at left shoulder.

No. 34, headed west, child's. Heart shaped stone ornament at neck.

No. 35, headed west, 2 pots behind head. Across the knees of No. 35 were two other skeletons; No. 36 headed north and No. 37 headed south. Two water bottles were wedged in where the bones crossed This place must have been used a long time and burials made years after the first, without reference to previous graves.

No. 38, headed north, two shattered pots at left of head.

No. 39, headed east, shattered pot at back of head and broken vessel at right hand.

No. 40, headed west, two pots behind the head and one at the right elbow.

No. 41, headed west. Two pots behind head.

Nos. 42 and 43, headed west. No. relics.

No. 45, headed west. Two pots behind head, water bottle at left of head.

No. 46, head south, broken bowl and fragments of effigy, water bottle at left of head.

No. 47, headed east. Two small pots behind water head, water jar left of head. One pot contained mussel shell.

No. 48, head west, broken dish and fragment of dish behind head. Broken effigy bowl left of head.

No. 49, head east, effigy bowl and pot behind head. Water bottle left of head across pelvis child's.

No. 50, perforated stone at neck. Small bowl at head.

No. 51, head east, broken pot and two broken bowls behind head. Small paint cups at right wrist. One bowl contained mussel shell.

September 9th. No. 52, head east. Broken dish and two broken bowls behind head. Two small paint cups at right shoulder.

No. 53, head north, bowl containing smaller bowl behind head. Water bottle at left shoulder. Broke bottle slightly with shovel.

No. 54, headed west. Water jar and small bowls left of head. Paint cups left wrist

No. 55, headed to north. Two broken pots left of head. Broken water bottle behind head.

No. 56, headed south. Broken water bottle behind head. Broken dish left of head. Paint cup right arm across breast child's skeleton.

No. 57, head south. Small cup on shoulder. Sea shell ornament on right arm.

Sept. 10th. No. 58, headed south. Effigy water bottle left shoulder.

No. 59, headed west. Small pot and water bottle behind head.

No. 60, headed north, large pot behind head. Effigy water bottle left of head.

No. 61, headed north. Small pot (rim broken) and water bottle behind head.

No. 62, headed south. Water bottle on left of head.

Report for week ending September 16, 1898. Seven fragmentary skeletons, no relics. One heap of five skulls, no under jaws or other bones. One heap of skeletons fragmentary, with three skulls. One heap of skel's fragmentary, with seven skulls. One heap of skel's fragmentary with five skulls. One heap of skel's fragmentary with four skulls.

Skel. No. 76, head south. Copper ornaments and bone break on neck and wrists.

FIG. 32 — EFFIGY OF ARMADILLO (?)

Salado valley S. 2–3

No. 77, head south. One shattered pot at head. One effigy bowl at head. Discoidal at pelvis.

No. 78, head east. Two small pots behind head. Pipe on right shoulder.

No. 79, head north. Spear head on right foot. Discoidal at right shoulder, two pots behind head. Small cut at left wrist.

No. 80, head west, no relics.

No. 81, head south. Two pots behind head, one containing shell. Pipe at left hand. Bone implement on right knee.

No. 82, head east, two spear points at right shoulder. One shattered pot and one pot containing shell behind head.

No. 83, head south. Squared bone at right knee. Copper ornaments and bone beads on neck and wrists. Bone ornaments on wrists, unfinished discoidal near left wrist. Ear pendants at head.

No. 84, child, headed south. Worked bone at pelvis, copper beads at neck.

Week ending September 24th, 1898 — One group of fragmentary skeletons. Three skulls, no under-jaws. Seven fragmentary Skel's found separately. No relics.

Skel. No. 85, head north. Shattered pot at head. Arm bone perforated.

No. 86, head west. Skull perforated. Pot with shell, and shallow bowl behind head.

Nos. 87, 88, 89, 90 and 91 buried side by side, heads north. Two of them, 88 and 90, were children. No relics. The others each had a shattered pot behind head. Directly underneath were Skels. 92 and 93, heads north, without relics, and Skel. 94 with two pots behind head, each containing a shell.

No. 95, child. Head east. Coal ornament on heart. Copper and beads at neck. Copper stained arm bones.

Skel. 96, head north. Effigy bowl and shallow bowl behind head, notched shell left of head.

No. 97, head south. Copper rings, ear pendants, etc., at head and neck. Spear and arrow point at left shoulder, pipe at right hand, spear at left knee.

No. 98, head south. Effigy bowl with shell and water bottle behind head. Bone, awls, needles, and flakes of bone and war paint at right of head.

No. 99, head west, no relics.

No. 100, head south. Ear pendants, shell beads, and copper at neck and head.

No. 101, head north. Pot and bowl behind head each containing shell. Found an oblong bowl in dirt, no shell near it. Broke bowl with shovel.

No. 102, head north. Twenty bone beads around neck.

No. 103, head north. No relics.

No. 104, head north. Stone pipe on left shoulder. These last three were side by side.

Week ending Sat., October 1st — Group fragmentary Skels. four skulls, flint celt and deer antlers with them. Edge of pot was broken and I broke it some with shovel. The group of fragmentary skel's, four skulls, no relics.

Skel. No. 105, head east. No relics.

No. 106, head south, perforated shells, copper and shell pendant at neck.

Nos. 107 and 108. Heads north and buried side by side. No relics. Arm bones of 108 perforated.

No. 109, head north. Pipe on left shoulder. Two arrows at right shoulder and spear point at right hip.

No. 110, head west. Water bottle with neck missing and Effigy bowl with shell. Edge of bowl somewhat broken.

No. 111, head south. Bear teeth at neck. Discoidal and stone ball at left wrist. War paint near left shoulder and deer antler near left elbow.

Nos. 112, 113, 114, 115 buried side by side. Heads north. 114 and 115 No relics. Small pot with rim broken at head of 113. Broke pot some with shovel. Pot had shell inside. Skel. 112 had oblong bowl (with shell inside) behind head. Found fragments of a large bowl or pot in ash pit, containing four small cups and a piece of sandstone with groove in center.

No 116, head west. Small pot with shell inside behind head, scraped pot with shovel.

Week ending October 8th, 1898 — Found nine Skel's. (Nos. 117, 118, 119, 120, 121, 122, 123, 124, 125,) side by side, heads to south and about ten inches in depth. All but 121 had a fragmentary pot or bowl at head. Beneath there were — Skel.

FIG. 33 — EFFIGY OF A BEAR (?)

Salado valley S. 1–2

FIG. 34 — EFFIGY OF AN UNKNOWN ANIMAL OR REPTILE

Salado valley S. 1–3

FIG. 35 — EFFIGY MORTAR (?)

Salado valley S. 1–1

FIG. 36 — UNKNOWN OBJECT

Salado valley S. 1–1

126, head south, four arrow points at left forarm, bowl with shell at left of head. Flint knife beside pot.

Skel. 127, head south, copper ornaments at each side of head.

Skel. 128, head south, pot with shell behind head.

Skel. 129, head north, pot with shell and small cups behind head.

Skel. 130, head north. Pot at left shoulder. Beneath Skel's. 126, 7, 8, 9, and 130, were Skels. 131, head south. No relics, had a child's skel 132, laying across breast and pelvis which had 25 bone bead around neck. Skel. 133, head north, Small pot with handle missing and bit of mica in it.

Skel. 134, head north, Small pot and Effigy bottle behind head. In other trenches were Skel. 135, head south, water jar fragment pot behind head.

Skels. 136, 137 and 138, heads with no relics. Skel. 139, head south, bowl with shell on left shoulder, spear at right forearm. Skel. ornaments at left hand and forearm, worked bone at right shoulder, (probably the handle for the spear or knife at right forearm).

No. 140, head south. Bowl made of a broken water bottle on left shoulder. Found group of skels. intermingled with six skulls. Saved two of the skulls though in poor condition, and extra large arm and leg bones. Found crushed pot in dirt, no skeleton near it. Skels. 141, 142; side by side; heads north; no relics. while digging dirt off above I struck a pipe with shel. 143, who was lying directly above 142. Broke pipe in two; can be easily restored. Also found spear and three arrows with 143. Pipe, arrows, etc., all at right hand and arm.

Week ending Oct. 15th, 1898—Skel. 144, head south; pot with shell behind head.

No. 145, head south, Fragment pot at right of head; four small cups at left of head.

No. 146, head south; copper at each side of head.

No. 147, head east; no relics.

No. 148, head west; no relics. These two were over lapping each other.

No. 149, head south; small pot with rim broken behind head.

No. 150, head south; pipe in right hand; one arm bone per-

forated. A stone of about ten pounds weight rested on the mouth, and the lower and upper jaws were badly crushed.

Nos. 152, 153, 154, 155, side by side, heads to north. No. 153 had no relics; others had fragments of pots behind heads.

Skel 156, head north; pot with rim broken and containing shell behind head; discoidal at right shoulder; two arrows at right fore arm.

Skel. 157, head south, no relics.

SUMMARY.

Skeletons headed North	43
Skeletons headed South	41
Skeletons headed West	30
Skeletons headed East	27
Cardinal point not given	16
Total	157

FIG. 37 — UNKNOWN OBJECT

Salado valley S. 1–2

FIG. 38 — UNKNOWN OBJECT

Salado valley S. 1–2

After a few weeks' rest, the writer examined the Salado river valley for some twenty miles above Phoenix, and ten miles to the west (down stream).

Mr. Peabody was anxious to learn of the interesting country —one quite different from the San Juan region — and he directed that explorations be made.

The many and large adobe ruins throughout the Salado valley of Arizona have long been known to archaeologists. The "City of the Dead" was explored by Prof. Frank Hamilton Cushing nearly twenty years ago, and in it were found many remarkable objects in shell, pottery, bone, turquoise, etc. It should not be forgotten by archaeologists that when Cushing announced the discovery of some shell frogs, his statements were doubted, and it was even intimated that Cushing had made one of these himself. Since that time explorers have found, in addition to shell frogs, shell and bone implements inlaid with turquoise, not only in Arizona but also in New Mexico. Thus time has more than vindicated the truthfulness of Cushing's observations.

Anything unusual or contrary to accepted notions or opinions among archaeologists may breed skepticism. When it was customary, twenty years ago, to decry Squire and Davis' discoveries among the mounds, some writers went even so far as to say that the pipe sculptures could not have been made with aboriginal tools by Indians. Had one or two such objects been found at the Hopewell Group, when it was explored in 1891–2, the same doubt might have arisen. But the Effigy mound of that group produced quantities of all kinds of unusual things. In fact the very numbers (not taking into account study of the copper, of carvings, etc) disproved such a theory. Nothing that has been found in prehistoric monuments in America (where purely aboriginal occupation is above question) is beyond the ability of the pre-Columbian natives to produce.

The art in the Salado valley was high. Yet it was different from that exhibited in the cliff dwellings farther north. Probably we have two or three cultures in the Colorado Basin, the

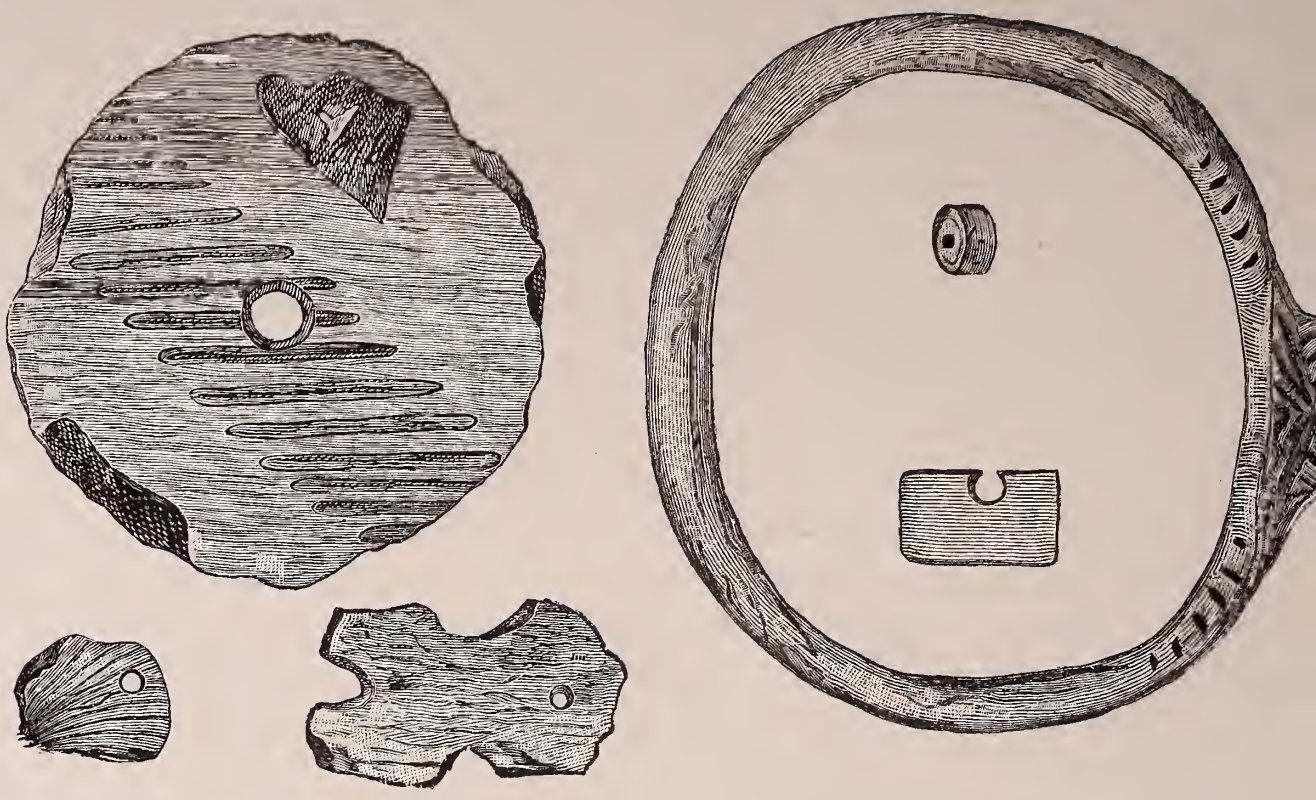

FIG. 39 — SHELL BRACELET, TWO TURQUOISE BEADS, A DECORATED POTTERY DISC, A SHELL AND A SLATE PENDANT from the ruins near Mesa
S. 1–1

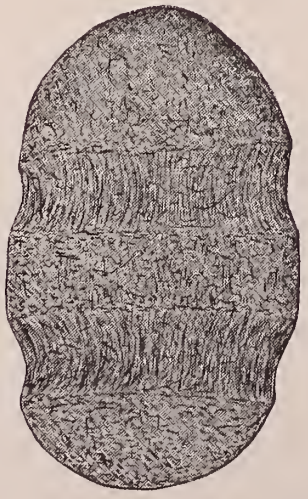

FIG. 40 — A DOUBLE GROOVED HAMMER
From ruin south of Phoenix S. 1–2

Cliff-dwellers, Boulder Ruin people, Adobe Ruin people, etc. These are not accurate terms, but they will serve to indicate the various cultures. The Basket or Cave people of Southern Utah may mark a fourth tribe.

Art in shell is characteristic of the Salado valley pueblos. Shells occur in great profusion in the ruins, and are scattered about on the desert. Either there was extensive trade with the natives living along the seacoast, or the Salado people made frequent journeys to the salt water. In the museum at Andover are over two thousands objects, chiefly shell and stone, from the ruins.

When the valley had been examined, the writer began collecting for Mr. Peabody, employing from two to seven men as occasion required. Not only were several ruins partially explored, but purchases were made from boys and from Indians. The frequent sandstorms, sweeping across the hard floor of the desert, leave exposed numerous objects, both large and small. Indeed, the number thus found is more considerable than one would imagine, and the author of this BULLETIN has frequently collected all the specimens he could transport in one afternoon, through the simple process of riding from one ruin to another upon his bicycle and keeping his eyes on the ground.

The Pima and Maricopa Indians at Tempe and elsewhere in the Salado valley make and sell to tourists, idols, mortars, rings, etc. Sometimes it is difficult to distinguish between the ancient and the modern. But in case of doubt, the writer refused to buy specimens of them. However, as some discussion has arisen regarding the age of several of the stone objects, it is well to inquire further into the subject.

As to the Salado artifacts, it must be borne in mind that the conditions in the Southwest are vastly different from those which obtain in the moist climate of the East. A stone on which is carved a snake or an unknown figure may be as old geologically as any stone in the East. Geologists may say 50,000 or 5,000,000 years, that does not matter. The age of the carving — the work of man — is an exceedingly small per cent. of the age of the stone. In the East the cutting weathers until it looks almost as old as the stone. In the Southwest it may or may not weather, or at least only slightly; depending upon the

FIG. 41 — TYPICAL AXE OF THE SALADO REGION

Ruin south of Phoenix S. 1–2

conditions whether it is buried, or lies upon the surface or in a depression, or rests upon a knoll. Yet it may be a thousand years old. The dryness of the salt valley need not be commented upon here. It presents a condition totally different from that of the East. On this account picture writings upon the rocks are frequently scarcely weathered, and, although of designs manifestly not modern, look very fresh. Pictographs on rocks, overlooking the Licking, Ohio, or Susquehanna rivers of the East, have disappeared.

Many of the relics themselves are made of soft limestone, or a chalk-like formation, shales, etc. Others are made of hard granite boulders, lava, and sandstone. The softer stones have worn considerably all over, and, if their history was not known, might be considered by museum men as frauds, whether dug from ruins or bought from Indians. Some of the cuttings on the harder stones look rather fresh, as has been remarked.

There is an unfinished axe in the Andover museum which appears as "fresh" as if made yesterday. This object was found on a high terrace bordering the Merrimac river in Massachusetts in dry, white sand five feet deep. Its age is beyond question. Equally fresh tracings on desert boulders are to be seen. Some of them, preserved in the Andover Museum, may have been pecked by modern Indians—particularly those designs relating to the snake, lizzard, turtle, and bird.

At Mesa, Arizona, (18 miles from Phoenix) is an adobe ruin about 13 meters high and nearly 220 meters long. Cushing considered it the most promising of that entire region.

With a force of five men the writer spent a week in digging in the upper rooms. Some of the objects discovered are shown in figs. 39, 46, and 51, and the mound in fig. 24. However, the building is so extensive that the work done appears insignificant —a mere scratching. A careful estimate, based on the cost of the large Hopewell Mound (the effigy which was 170 x 70 x 7 meters), places the cost of exploration of Mesa ruin at more than $17,500. Scattered about, and within 200 meters, are fifteen or more smaller ruins.

A peculiar feature of life in the Salado valley is the mescal pits, the pottery kilns, etc. Some pits contain slag and other evidence of great heat. These places are numerous along the

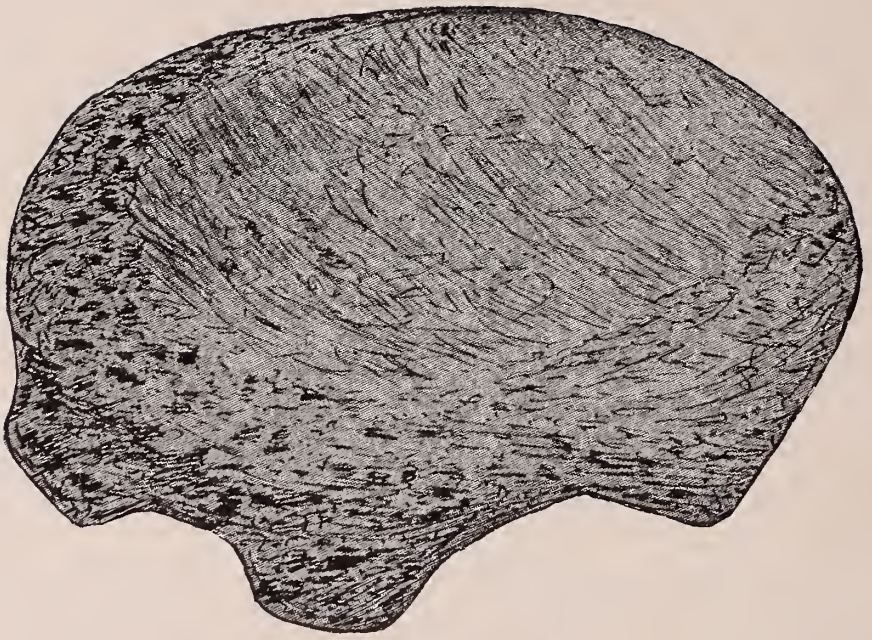

FIG. 42 — EFFIGY MORTAR (?)
Salado valley S. 1–2

Salado, particularly near Mesa. Some are more than six meters in diameter.

Six miles south of Phoenix, near the foot of a high ridge, is a pit three meters in diameter surrounded by a circle of burnt stones. There is a well defined "rim" a meter wide and fifteen cm. higher than the surrounding soil. Near by is a circle of burnt stones, but no depression.

There are several small ruins, on the south side of the Salt River opposite Phoenix, (and one large one) in this group. They range from five miles directly opposite (south) of Phoenix and about two miles beyond the Salt River, to one mile east and one mile west along the same. Our excavations in the smaller ones indicated that they were simply open air camps or refuse heaps — the accumulation of long cooking, etc., in one place. But our work in the larger ruin was productive of good results. We found that it was some 120 meters long and 90 meters wide and stood two stories high. But that it was of such great age that the adobe bricks have nearly disappeared. Some of the rooms have been fairly preserved. It appears to have been two stories high. The walls were thick, the lower rooms some two to two and a half meters in height. Today the ruin appears as a mound and stands about four meters high, being sand-covered. About one and one-half meters below the present surface there appears to be a hard floor, not so much of adobe as of packed clay, and upon this floor at various points we found axes, some rude effigies of tufa, metates, mano stones, rings, etc. We also found three skeletons, and the crania of two of these were preserved. Low walls of rooms are observed. But the upper portions of the walls have disintegrated, and they now stand about one meter high. The writer thinks that the floor indicates a second occupation of the ruin. Some wandering tribe came along and levelled off the top of the structure and constructed thereon some low rooms. After they had departed (leaving such relics as we found) time levelled their walls. No trace of roof was found; the logs and thatch having completely perished.

In figs. 39 and 45 are exhibited some of the specimens here found. Wishing to explore the whole ruin, seven or eight men were employed, and for three weeks continued digging steadily.

FIG. 43 — EFFIGY OF AN OWL (?)

Salado valiey S. 2–3

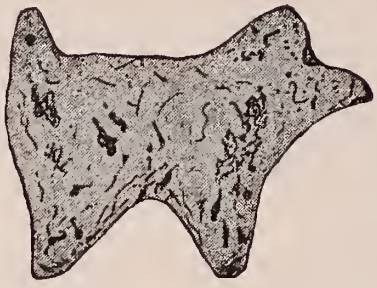

FIG. 44 — CLAY EFFIGY OF AN ANIMAL

Salado valley S. 1–1

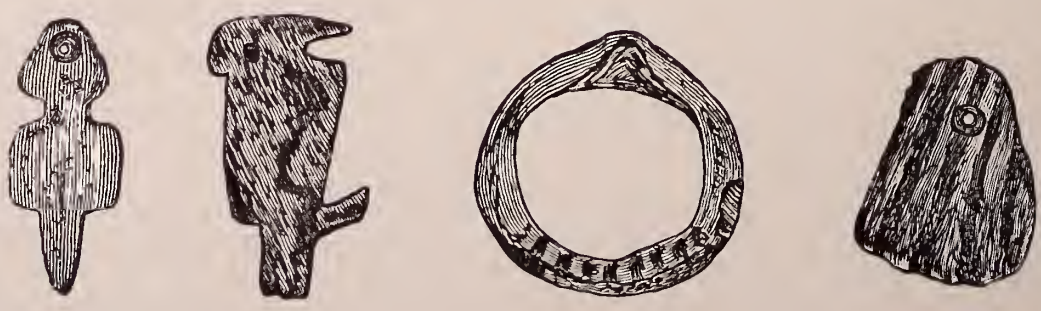

FIG. 45 — SHELL PENDANTS, RING AND EFFIGY

Salado valley S. 1–1

Twenty feet from the edge of the outer wall we found a circular depression half a meter in diameter and 25 cm. deep. There were no ashes in it, yet it was burned to the hardness of brick.

Near the further edge of the ruin, from this circular basin, were found some forty axes of greenish granite. Twenty-two of these were in one room — a small room, as indicated by the wall bases. There was little difference in the forms of the twenty-two axes, and the material was identical. Indeed, the same patterns prevailed, all the axes being three cornered, sharp and beautifully worked down to a tapering edge. These implements may have represented the stock in-trade of the pueblo, or the axe maker may have lived there. Caches of chipped implements are common, but of axes such discoveries are rare.

It should be stated that the ruin at Mesa is upon a raised platform two meters high, and that the terrace upon which the ruins are located is eleven meters above the river. There is a circular depression near at hand which is sixty meters in diameter and three meters deep. There are "reservoirs" or depressions here and there. The smaller ones may have been Kivas, and their exploration is suggested.

THE KALFUS RUINS.

This group is three miles due west from Phoenix and perhaps three miles north of the Salt River. It belongs to the series lying on both banks of the stream and extending east and west for some 25 miles. It consists of ruined adobe walls and accumulated debris.

The two larger buildings, called temples by Mr. Garlick, who worked some years with Mr. F. H. Cushing, occupy a central position, and are both surrounded by an adobe wall three meters wide and averaging half a meter high. To the south, this wall forms a sort of platform extension of the south or highest temple.

The one to the north is east and west fifty meters; north and south, seventy-eight meters. Archaeologists might differ as to where the "wash" or accumulation at the base end and the natural surface begins. Hence, these measurements might be a meter more or less upon each side and end. The writer would suppose that the original building was something like 35 x 60 meters.

The wall measures: west side (north and south), 160 meters; north side (east and west), 80 meters.

To the east, lying between it and a smaller ruin, is a low place, evidently a reservoir, also from whence earth was taken for the adobes. To the west is a similar depression. Above these low places the ruin stands four and one-half meters. From the level, the height is about thirty-three meters, but the ends are lower by one-half or two-thirds m. than the central positions.

During the course of exploration we uncovered seven skeletons in various stages of preservation. The sides of the graves were smooth, of plastered adobe. One adult to the west had a child with it in the same grave. The little one was rather doubled across the adult. It is interesting to observe that three of the bodies headed east and two west. The last skeleton exhumed (see fig. 26) had a whole pot near the head and a fragment of large olla in which were portions of a cremated skeleton

FIG. 46 — TWO FINELY WORKED EFFIGIES IN BLACK ONYX AND TWO MINUTE ARROW POINTS OF OBSIDIAN From the large ruin near Mesa, Arizona S. 1–1

FIG. 47 — GROUP OF VARIOUS SHELL EFFIGIES

From the Salado valley ruins S. 5–9

In a room, the floor of which was as hard as if it had been burned, we found a fine slate tablet, seven axes, three metates, two mortars, and other things. The room floor was two and one-half by four meters in extent.

When the main trench was down about three meters we observed numerous pottery fragments, ashes, charcoal, and broken bones. These were in little pockets or ash pits, ranging from half a bushel to as much as three or four bushels. One large ash-pit was three feet in depth. No floors could be traced and no walls found in the central cut save at the ends. We cleaned out the central cut to the original base, exposing six meters by 19 meters, and found little or nothing. It was even difficult to find the original base. No general floor seemed to have existed, and we abandoned the central part of the cut completely mystified as to the purpose of the ruin at this point.

The west trench showed several small rooms. The walls of these were about 40 to 50 cm. thick and fairly regular. Some few axes, metates, and other objects were found near the surface of the trench, but nothing further down or upon the original surface save the usual charcoal and ashes and pottery fragments. In fact, nearly all the objects occurred near the surface of the mound. We put the team and scraper to work and scraped off a foot from portions of the structure not yet examined, finding, during this operation, some axes, grinding stones, metates, chips of obsidian, and broken ollas. Of the latter several were saved, and though in a fragmentary condition it is quite probable that they can be restored.

After completing work upon the large ruin, we examined a number of small ones of the same group.

In these were found no walls save in the case of one. There was a well defined room, the floor being a meter below the present surface. A metate and grinder and an axe, also a broken olla were found upon the floor. The other ruins seemed to be more the nature of mounds resulting from long living upon one spot, or due to the accumulation of debris, The pottery in and on them was largely plain, although decorated varieties were not wanting.

Regarding the north temple the writer would say that it does not present any regularities such as Cushing found at Los

Muertos, but on the contrary seems to be a collection of small rooms built upon an original kitchen-midden at various times. The writer opines that no restoration of a complete series of rooms surrounding a common court can be constructed for the simple reason that no such regularity of construction ever existed.

The rooms to the north and west and east seem to be small, with one or two exceptions, and to extend down not more than two meters in any case, and usually about one meter.

The higher temple to the south may present more interesting structure, but it was thought best not to attempt its exploration.

Save at the Kalfus mines and one other, no cremations were discovered while the writer was in the Salado country. In a small ruin near Mesa several basin-shaped plain bowls were dug out of the corner of a room, and in one of them was about a quart of calcined human bones. Often large ollas are dug up, and they invariably contain burnt bones.

The adobe ruins of the Salado offer a rich field for archaeologists. Particularly does the great ruin at Mesa appeal to the explorer. And near Los Muertos, where Cushing worked so long and faithfully, are other sites that should be examined.

It is to be hoped that the region will not long be the prey of the curio hunters and the irresponsible collectors.

South of Phoenix, some six miles, are remarkable pictographs upon the rocks and cliffs of the bluffs bordering the Salado river. They number a hundred or more, and may, for aught the writer knows, extend for some distance in either direction. Several of the best ones are shown in figs. 48, 49 and 50. The originals are twenty to thirty times the size of the illustrations.

Two pottery bowls were found south of Phoenix, that are unusual in that they contain much flower gold. The natives must have found gold-bearing clay, and, with no idea of the value, made it into pottery. As they would naturally take the surface clay, probably larger nuggets could be found deeper down. The pottery was shown in Phoenix in 1898 and created some excitement, but those who searched were not rewarded for their pains. Possibly the pottery came from considerable distance. Certainly the clay out of which it was made was not found near the ruin.

FIG. 48 — PICTOGRAPHS

From Bluffs south of Phoenix S. 1–20

The illustrations (45, 46, and 51) give a fair representation of the small effigies numerous about the adobe ruins of Arizona. These are characteristic of the region, and their counterpart is not found anywhere in the United States. In the collection are numerous shells, exhibiting different stages of workmanship. In some the crown has been broken off; in others the grinding has begun, and step by step the process can be traced to the completed shell bracelet. There are finished and unfinished shell frogs, little shell discs and small ornaments with wing-like projections on either side. From these to the effigy proper is but a step. The finer shell effigies, illustrated by fig. 47, exhibit action, and are exceedingly well made.

Transportations of these shells from the Gulf of California across the American desert must have induced hardships and privations. If the natives came up the Colorado river and then followed the Salado to the Phoenix ruins, their route would have been longer but undoubtedly easier. They were assured of a water supply.

As to the number of similar effigies found by Cushing in his work at Los Muertos, the writer is not informed. It will be observed that fig. 51 is a half tone plate of four effigies shown in fig. 47, which is reduced from a drawing. The onyx bead in fig. 51 does not appear in fig 47. It was the writer's wish to present photographs as well as drawings of these remarkable specimens. The half tone plate (fig. 51) is full size and the drawings about five-ninths size. In fig. 46 the two effigies and the two arrow points are shown full size.

Most of these effigies are perforated. The shell frog is not. Neither is the small owl (?) effigy shown above the frog in fig. 51. All of these are exceedingiy well executed. The lower right hand figure in 47 appears to have been the head of an aquatic bird. Originally it may have formed a part of an entire effigy, as there are traces of break extending across the neck. Careful grinding has almost obliterated these evidences.

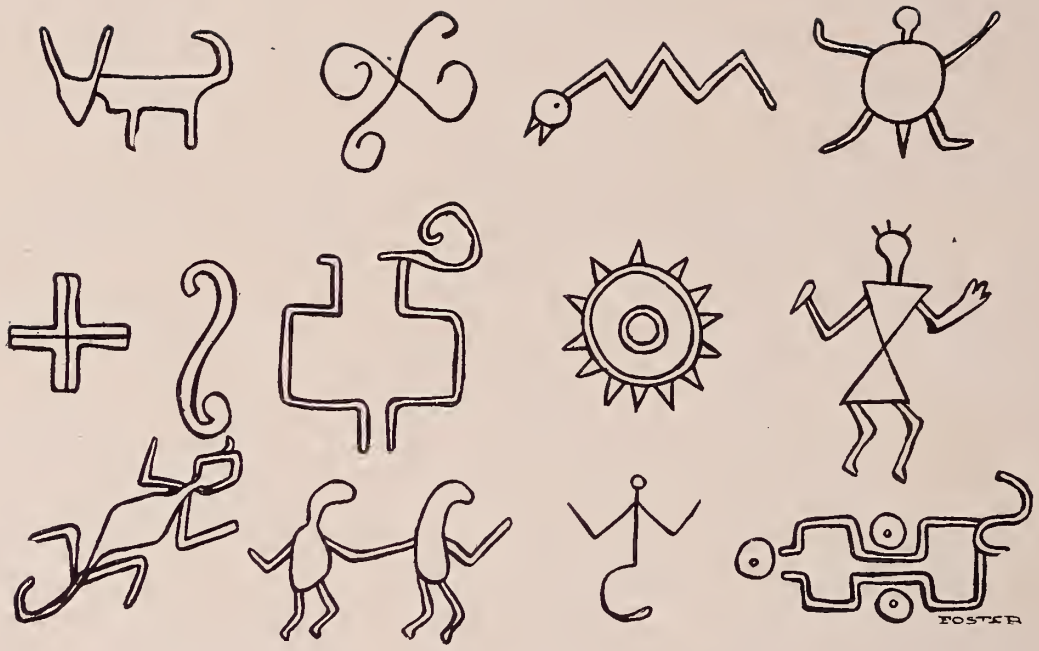

FIG. 49 — PICTOGRAPHS

From Bluffs south of Phoenix S. 1–20

COLLECTING AT FLINT RIDGE.

Mr. Peabody was greatly interested in Flint Ridge, particularly so as his home was within fifteen miles of the eastern extension of the quarries. In the summer of 1899 he wished that the writer would send Anderson on a collecting trip to Flint Ridge. Anderson spent about three months and obtained an exhibit totaling over five thousand objects. There was also another reason — and this is indicative of Mr. Peabody's kind heart. Anderson had contracted malaria in the south, and Mr. Peabody thought that a season's residence on the high ground of eastern Licking county would "drive all the malaria out of his system." He was entirely correct in his opinion. Mr. Gerard Fowke, in the interest of the Smithsonian Institution, made a study and exploration of the place over twenty years ago. His observations and explorations are detailed in the "Smithsonian Report" for 1884.

Mr. Fowke prepared a more condensed account of the remarkable place for one of the writer's earlier works.* The book is now out of print, and as Mr. Fowke's paper is important, and worthy of preservation, it is incorporated in this BULLETIN as an appendix.

The obsidian quarries of the west, or the mica mines of North Carolina, or the nodular flint deposits in Tennessee, or the jaspar quarries of Pennsylvania — none of these exerted as much influence upon the aborigines as did Flint Ridge. Possibly, if the copper found in the mounds came from a limited area from either Wisconsin or Michigan, such a site may have been deemed more important in the eyes of the barbarians, as copper was naturally more mysterious than flint. But granting that the copper comes from a widely distributed area, the writer is of the opinion that Flint Ridge furnished more material for aboriginal usages than did any given area in the United States. Arrows and knives made of its multi-colored chalcedony and chert are found in western New York and far down the Mississippi. Throughout the Ohio Valley no one may know what

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* *Primitive Man in Ohio*, p. 30.

FIG. 50 — PICTOGRAPHS

From Bluffs south of Phoenix S. 1–20

numbers of chipped implements were made of its stone. Some of the mounds contain chipped objects of this material; others do not. It is found on some sites, on others it does not occur. Such facts are of great archaeologic importance, and relate to the antiquity of the workings on the Ridge. No reference to Flint Ridge and its pits can be found among the earliest travelers and explorers. James Smith, the famous captive, in his well known narrative, does not allude to it. Smith was in Ohio shortly after Braddock's defeat, and there were few white men in the entire region. Explorations indicate that there has been no quarrying at Flint Ridge in the last four or five centuries. Speculation upon the age of the pits judged by timber growth is not satisfactory. Yet the earliest settlers noted large trees growing in pits and upon the fields where unfinished objects are most numerous.

In the four illustrations presented (figs. 76–7–8–9), a few characteristic Flint Ridge implements are to be seen. Contrary to some quarry sites the material at Flint Ridge is found to be both finished and unfinished. Numbers of the natives carried away discs, turtle-backs, and thick blades, and did the final work at their homes. Others stopped within five, ten, or twenty miles of the Ridge and there completed their weapons and tools. This observation is quite true, for there are scores of workshop sites on the hills and in the valleys north, south, east and west from the main deposits of Flint Ridge.

Whether Flint Ridge was sacred ground, as was the Catlinite quarry in Minnesota, is an open question. The presence of earth and stone fortifications about the Ridge and in the vicinity would indicate that the Ridge was not neutral ground. Yet such observation is more or less speculative, because these works may have been built at a subsequent period when the quarries were not worked.

About the main pits themselves agriculture is impossible. In some fields spalls, chips, cores, etc., are more numerous than earth itself. Dr. Wilson from one spot took out a section three or four feet in depth of which upwards of one-third consisted of fragments or chippings, the work of man. It has been suggested in the past, and the writer wishes again to call attention to the suggestion, that some museum make an exhaustive survey

of the Ridge, mark all of the pits, and explore as many of them as practicable.

In prehistoric times Flint Ridge was more necessary to the life of the barbarians than any other site or earthwork in the entire Ohio valley. Its preservation to future generations should be assured by purchase, through the medium of some society or other organization.

Flint Ridge has not suffered as have the mounds and graves of the Mississippi valley or the cliff houses and adobe ruins in the west, because collectors of fantastic objects, who are responsible for the destruction of other monuments, found little of interest in the workshops and pits of Flint Ridge. Although some tens of thousands of specimens are to be found in museums and the hands of private collectors, Flint Ridge remains practically intact It is truly one of the wonders of aboriginal life in America. It is so extensive that no survey could hope to make thorough examination short of two years, but such an exploration might reveal to the archaeologic world many things as yet unknown.

Typical flint discs and turtlebacks are shown in fig. 76. There are two hammerstones in the lower left hand corner. The specimens shown are all one-fourth size. The largest specimen is a rough block of flint, practically as quarried. A half-dozen blows have been struck on either side. The others represent more or less early stage work, although all of them are more finished than the one just mentioned.

The leaf-shaped and unfinished implements in fig. 77 represent the stage where the hammerstone is exchanged for the flaker.

Fig. 78 are blades practically complete, which may be employed as knives without further work. As spear-heads they must be pointed and barbed. Both varieties are shown in this illustration.

Fig. 79 gives a fairly correct representation of the famous cores of Flint Ridge. These are seen in the two lower rows. Several of these are cone-shaped. They occur by countless thousands at Flint Ridge and are evenly grooved. From these flake knives were detached. Flint knives were quite sharp and doubtless served as cutting instruments, razors, etc. Eight of these are shown in the upper rows.

FIG. 51 — SHELL FROG, TWO SHELL EFFIGIES, ONYX BEAD AND EFFIGY FISH (jade?)

From the large ruin near Mesa S. 1–1

It is of importance to archaeologists to know that Professor William C. Mills, Curator of the Ohio State Archaeological and Historical Society, Columbus, has examined Flint Ridge and other materials. By the following appended report, made by Mr. Mills to the writer, will be observed that it is possible to distinguish the material of doubtful specimens by microscopic analysis.

The Ohio State
Archaeological and Historical Society.

Columbus, Ohio, October 30, 1906.

Dear Mr. Moorehead: —

Your letter of the 26th received and contents noted.

For a number of years I have been studying the flints of Ohio by making microscopical sections, and of the flints I secured one hundred and ten good slides. These slides show that the Flint Ridge material is a very fine grained variety containing but little iron or other foreign substances, and under the microscope it shows a fine grained aggregate of chalcedonic particles. The structure is crypto crystalline and so fine that the optical properties of the individual particles cannot be determined. In other sections we find that throughout this crypto crystalline base or ground mass are scattered numerous colorless polarized particles of chalcedonic material in a coarser condition; while in other segregations areas of the same material showing fan shaped arrangements of the particles and on the majority of the slides made show small areas of granular quartz; while in many of the slides the remains of foraminifera are quite abundant. Up to the present time I have worked out upwards of twenty-five species of foraminifera.

Very truly yours,
Wm. C. Mills.

FIG. 52 — ENGRAVED SHELL

Tennessee S. about 1–2

EXPLORATIONS AT HOPKINSVILLE, KENTUCKY.

In January, 1903, the Department received several communications from Miss Mollie Hall of Hopkinsville, Kentucky, regarding Indian cemeteries located upon the farm of Mr. James Willis, about four miles south of the town. Early in April the Curator visited Hopkinsville, and spent some two weeks in an exploration of the graves on Mr. Willis' land. Mr. Willis kindly consented to a thorough exploration. Mr. Charles Anderson, a local photographer, was engaged, and seven or eight negroes were employed for manual labor. A total of 103 graves were opened and 100 negatives were taken. Mr. Anderson kindly secured permission for exploration of other sites after the work had been completed at Hopkinsville.

We divided the field into lower and upper sections. These are about one hundred and twenty meters apart. There may be graves between both, but this cannot be determined without more extensive digging than we could do. The force of laborers dug twenty or thirty holes daily and examined, quite thoroughly, some two acres of land.

These graves range in depth from one-third to one meter, and were scattered throughout some fifty acres of land. It is quite probable that all of the graves were not found and opened by our party. The average grave is one meter and four decimeters in length, three to five decimeters in width.

Three graves close together covered three and two-tenths meters in extent. Our total digging covered an extent of forty-seven meters in both upper and lower cemeteries.

A certain wide grave contained three bodies, one being north and south and the others east and west. But such an interment was out of the ordinary, none just like it was found here or elsewhere. An unfinished stone celt was found in one grave.

Several hundred yards to the east of the field is a deep depression in which is a large spring. The level of the spring must be twelve or thirteen meters below the average level of the graves. The spring has a strong, steady flow, and is characteristic of similar underground springs found in Kentucky, Ten-

nessee, and Missouri. It bubbles up abruptly at the north end of the depression, flows along tranquilly for some one hundred meters, and then sinks into the ground again. The entire depression is oval in shape, and the banks are as abrupt at the outlet as at the fountain head. The presence of this spring may have induced the natives to locate their village and burial ground on the surrounding land above.

The graves were of the character common to southern Kentucky and northern and central Tennessee. Stones were placed upon edge on either side of the body, and a large, single, thin slab at the head and at the feet. The floor of each grave was lined with thin slabs, as was also the top. In other words, the material for each grave was taken from adjacent creek beds, wherein slabs of the Cincinnati and Niagara groups of limestone formation abound. These streams were quite convenient for the natives, and all they had to do was to visit them, perhaps do a small amount of quarrying, select such slabs as suited their purposes, and carry them to the elevation above — a distance of about three hundred and fifty meters — and inter the dead, using these stones as walls for the graves.

The neatness of some of the graves was noticeable, while in others, more or less carelessness of construction was displayed.

Of relics and utensils there were few, most of the interments consisting solely of the body. Usually the subject was placed upon the back, the hands extended at the sides, the legs straight, and the whole subject in such a position as to indicate that he was buried with the flesh on the bones. In certain instances the burial appeared to be made after the bones were denuded of flesh. Occasionally, we found two or three bodies in a grave. In such cases the grave itself did not vary from the ordinary, save in the number of interments, but the peculiarity was marked in that the bones were in confusion, or, if not in confusion, the two or three crania were placed together, and the longer bones, the femur, humerus, tibiæ, etc., were heaped by themselves. As a theoretical consideration, it might be said that these represented bodies of persons slain in battle, or that the bodies were preserved by the tribe making these burials until the flesh had decayed from the bones. Certain it is that

FIG. 54 — ENGRAVED SHELL

From a grave on the Willis farm S. 1–1

FIG. 55 — HUMAN EFFIGY PIPE

From a grave in the Willis cemetery, Hopkinsville, Kentucky S. about 2–3

FIG. 56 — EFFIGY

From a mound near South Carrollton, Kentucky S. 1–1

the bodies of persons recently deceased could scarcely be put into so small a space, such as is apparent in some of the graves.

We found graves two decimeters in width and one meter in length, and less than two decimeters in depth, which contained from two to three burials. Therefore, it is apparent, that numbers of deceased persons must have been kept in a charnel house for some time.

Considered in its entirety, Mr. Willis' cemetery presents several problems for the consideration of the archaeologist. Although the graves in construction are similar to those of southern Kentucky, northern and central Tennessee, yet, in the absence of clay vessels and large flint implements, and in the almost total lack of ornaments of shell or bone, they are different from those farther south. Flint chippings and broken pottery were quite frequent upon the surface, but few of these were found in the graves. Whether this indicates a different tribe from the true stone-grave people of Tennessee, or whether it marks a division of that tribe, is a question for future solution. The culture is quite inferior to that evinced by the Nashville graves and those of other regions.

Several graves were quite different from anything we had found hereabouts or in other (northern) portions of the country. In six or seven graves, placed near together, the skeletons were headed the same way, south, except the skeleton of a child, which was headed north. The preservation of the bones is the same as in other cases. This may be due to the peculiar condition of the soil, or it may be due to the fact that the interments were post-Columbian, which the writer doubts. On the field evidence, it seems that these interments are prehistoric, and not of the last three or four hundred years. If this statement is wrong, the writer stands corrected. The bones have been buried so long that every bone of the body is of the same color as the soil surrounding it. It was, therefore, necessary to whiten with pulverized chalk each skeleton in order to bring out the bones into relief, otherwise there would be no contrast between the skeleton and the surrounding earth. The graves seem to have been placed in no regularity as regards the points of compass—that is, some of the bodies show the head east, others south, others southwest, others northwest, etc., therefore

FIG. 57 — RAVINE AT JOHNSON'S FARM

Near Herndon, Tennessee. The nodules are seen outcropping in two layers

FIG. 58 — A CLOSER VIEW OF THE NODULES IN POSITION

Ravine on the Johnson farm near Herndon, Tennessee

no hard and fast rule can be established as to the burial of the bodies either in this direction or that direction, and the evidence is that these bodies were simply interred in stone graves, as previously mentioned.

Fig. 55 is an effigy pipe from one of the graves at Hopkinsville, Kentucky. Fig. 56, a little effigy head from a mound near So. Carrollton, Kentucky. Both of these are from prehistoric burials. The effigies are remarkable in that the features are strongly southern, of that peculiar type which will at once be recognized by a study of the illustrations in General Thruston's book; certain of the human effigies found by Messrs. Squier and Davis are also identical with these. Mr. Mills found an idol pipe in the Adena mound, Chillicothe, Ohio. This pipe has the same peculiar features noted in the others. These various effigies may be taken to be likenesses of the people that built the mounds of the Mississippi valley. It will be observed by comparisons in museums that such Iroquois faces as are portrayed by means of effigies are quite different from the type represented in the Ohio, Tennessee, Hopkinsville, and So. Carrollton or Scioto finds.

A FLINT QUARRY IN TENNESSEE.

Having ended explorations on the Willis estate, Mr. Anderson and the writer engaged a large barge and with our negro laborers visited several sites in Tennessee. We examined village sites that had been favorably reported to us, and also some cemeteries, but all of these had been more or less disturbed; therefore, we concentrated our efforts upon the flint quarry on Mr. George Johnson's farm, six miles over the Tennessee line in Montgomery Co., and about eighteen miles from Hopkinsville.

Village sites in the neighborhood contained a great deal of nodular flint. From a study of these the writer apprehended that the parent ledge must be somewhere near at hand. Inquiry confirmed this opinion, and we were soon at work on the original site. Figs. 57 and 58 show one of the ravines and flint nodules in situ. Several bushels of material in various stages of manufacture were found by our men on the surface in the course of one day's examination.

This was a very important discovery, as nodular flint had not been previously found in Tennessee in any considerable quantities, so far as the writer is aware. Mr. Johnson kindly permitted excavation, and on the edge of the bluff, toward Little River, we found that the chips, spalls, and refuse extended to a depth of one meter or more. This is distant about three meters from the edge of the ravine, near its head. Other points near this one revealed the fact that the flint deposit varied from one-fourth to two meters in depth. The ravine itself deepened and widened as it came nearer to the river, and at the mouth we found a ledge of limestone — rather soft limestone — in layers or shelves from one-half to two meters in thickness. From the top of the outcrop of the limestone to the surface of the water, at a distance of five or six meters, flint nodules occurred frequently, and there is abundant evidence that the natives worked both the ravine and the land on either side. All over Mr. Johnson's farm, to the extent of at least fifty acres, are great quantities of chips, spalls, leaf-shaped implements, hammerstones, etc.

FIG. 59 — POTTERY S. 1–4

Presented by Mr. Clarence B. Moore to the Department, and taken by him from mounds in Florida during his explorations.

FIG. 60 — FLORIDA POTTERY S. 1–4

Presented by Mr. Clarence B. Moore and taken from Florida mounds by him

FIG. 61 — CASE CONTAINING MR. CLARENCE B. MOORE'S FLORIDA COLLECTION S. I–88

This case is 7 meters long.

About five miles from Herndon, and just over the line in Tennessee, is a high bluff overlooking a tributary to Little River. On this bluff an immense amount of chipping has been done, both from the nodular flint and from a brown or yellow chert, which occurs somewhere in the neighborhood. At this point material sufficient to fill a soap-box was picked up in two hours' search. The material is of the same general character as that found on the Johnson farm, six miles distant.

In the "American Anthropologist" for July–September, '06, there is a comprehensive article of more than 130 pages entitled "Progress of Anthropology". This article states (p. 534) that Mr. Fowke and other searchers have been unable to find any large quarry from which the gray or bluish nodular flint was obtained. That is, flint in particular of the same character as the Hopewell discs. An examination of the Montgomery county deposit will reveal the same kind of material as that found in the Hopewell mound. And in the exhibit at Andover are a number of discs of the same workmanship as the ones from Hopewell's. The writer suggests that as the Cumberland river is not far from Mr. Johnson's farm, that discs might have been carried thither, then put in canoes and transported by water to a point on the Scioto opposite the Hopewell village. Small deposits of that material occur frequently, but no great quarry such as would account for the presence of countless numbers of knives, scrapers, and projectile points scattered throughout the upper Mississippi valley from Illinois to central Ohio and from northern Indiana to Knoxville, Tennessee. The writer does not claim that the quarry site on the Johnson farm furnished all this material. Indeed, the quarry is not of sufficient magnitude, but it is quite apparent that a great deal of work has been done in prehistoric times on the Johnson estate. The nodules vary from ten to twenty cm. in diameter, with a coating of grayish chalk-like formation on the exterior, and within are of the same color and appearance as the Hopewell discs.

Continued searching in the Clarksville region (northwestern Tennessee) may result in the discovery of much larger deposits. The writer would suggest a careful search of Little river and its tributaries, not only near the Johnson farm, but in the

vicinity of Herndon. Probably where the ravines are deeper, greater deposits will be found. In view of the scarcity of nodular flint deposits, the writer considers the discovery one of very great importance.

Monday, Tuesday, and Wednesday the entire force drove a distance of sixty-five miles and visited a dozen farms. These had been recommended to us by various persons who came to the scene of the exploration on Mr. Willis' farm, and kindly offered information regarding sites near the Cumberland river and elsewhere. Most of these grave groups had been disturbed to no little extent, but several were located which are promising, and might result in some discovery if an exploration were begun. But as it was necessary to explore Jacobs Cavern, some five hundred miles west of the Hopkinsville region, and as only six weeks remained for that purpose, the writer was compelled to defer further digging and, after shipping the specimens and skeletons to Andover, proceeded to Bentonville, Arkansas.

The Cumberland–Tennessee region, of which Hopkinsville is a part, merits thorough exploration. It is exceedingly rich in art in shell, and up the Tennessee and Cumberland are numerous cemeteries in Central Tennessee. In recent years some of the largest flint implements ever found in the world were exhumed from several of these graves, and are now in the Missouri Historical collection at St. Louis. A number of commercial collectors are traversing the region or voyaging along the Ohio, Tennessee, and Cumberland rivers in houseboats. These men cause the destruction of a large number of monuments, and museum men should take the field before further damage is done.

FIG. 62 — McELHANEY'S CAVERN

Arkansas

Described in BULLETIN I, The Exploration of Jacobs Cavern, McDonald County, Missouri. Department of Archaeology, Phillips Academy, Andover, Massachusetts. C. Peabody and W. K. Moorehead. 1904.

CERTAIN UNKNOWN STONE OBJECTS IN THE ANDOVER MUSEUM.

At a meeting of the American Anthropological Association, held in San Francisco during August, 1905, a paper was read by the Director of this Department, in which he and the Curator urged that an archaeologic nomenclature be invented. A committee was formed consisting of Dr. Hodge, Professor Wright, Mr. McGuire, Dr. Peabody and the writer, Dr. Peabody being chairman.

That we need an archaeologic nomenclature no one will deny. Particularly is this emphasized when one views the multitudinous stone artifacts and unknown objects which fill the cases in our museums. Some of these by their shape testify as to the purpose for which they were made. Others are of fantastic and unusual forms, are wrought from shales, granites, or quarztes, and because our ancestors made use of nothing like them we cannot conceive by comparison (or *lack* of comparison, rather) aright concerning them. For years they have remained an enigma.

The light of history fails to aid us. Such specimens as are here illustrated have not been found elsewhere in the world. Earliest explorers and travelers in America allude occasionally to stone pendants worn by the natives, but do not specify what kind. A student cannot determine from these early narratives whether a small slate ornament, a large winged-perforated object, or yet another form is meant. The historical references are vague; they do not help us. So far as the writer's reading extends, none of them assist in solving the problem. If there are references that clearly define the use of winged-perforated stones, and the writer has overlooked them, then he stands corrected. Manifestly, we must depend on the field testimony and follow the natural history method in treating of the specimens themselves.

Archaeologists, for the most part, are silent on the subject. Holmes, Rau, Beauchamp, Fowke, and others make brief remarks. Cushing had prepared a paper on such forms as are

FIG. 63 — GROUP OF PIPES

From various localities in the Mississippi valley

a—Scioto Co., Ohio.
b—Ross Co., Ohio.
c—Pipe made from a whale's tooth. Alaska.
d—Scioto Co., Ohio.
e—Miami Co., Ohio.
f—Scioto Co., Ohio.
g—Scioto, Co., Ohio.
h—Wabash cemetery, Indiana.
i—Hancock Co., Ohio.
j—Silver Creek, Morgantown, N. C.
k—Grovetown, Georgia.

FIG. 64 — GROUP OF PIPES

From various localities in the Mississippi valley

a—Meigs Co., Ohio.
b—Meigs Co., Ohio.
c—Ross Co., Ohio.
d—Forsythe Co., Georgia.
e—Miami Co., Ohio.
f—New England.
g—Geneva, New York.
h—
i—Frankfort, Ross Co., Ohio.
j—Ross Co., Ohio.
k—Scioto Co., Ohio.
l—Yellow Bud, Ross Co., Ohio. (Bogus)
m—Holmes Co., Ohio.
n—Ross Co., Ohio.
o—Richmond, Indiana.
p—Miami Co., Ohio.
q—Pickaway Co., Ohio.
r—Manchester, Adams Co., Ohio.

FIG 65 — THE FROG PIPE

From a village site at the mouth of Bush Creek,
Adams County, Ohio S. 1–2

FIG. 66 — BAR AMULET

Tennessee S. about 9–10

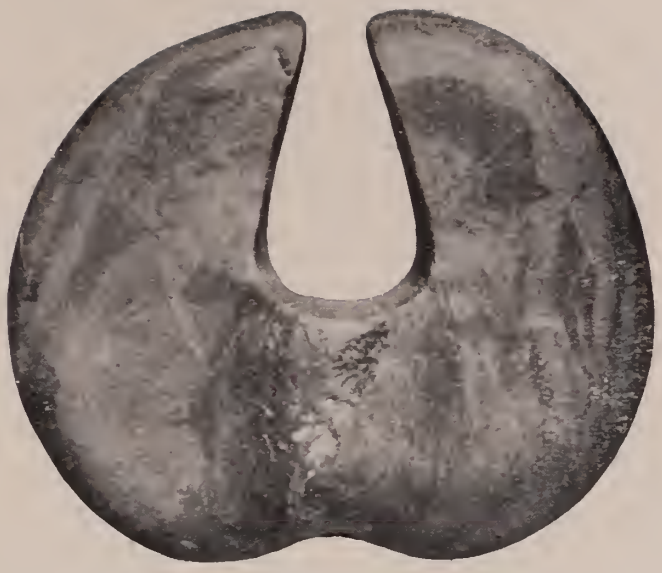


FIG. 67 — PECULIAR CEREMONIAL

Scioto County, Ohio S. 1–2

FIG. 68 — CANNEL COAL CEREMONIAL

Mercer County, Ohio S. about 3–10

Found on the breast of a skeleton in a gravel pit.

here presented, but no one seems to know what became of it — an unfortunate thing, most certainly.

Several museums possess fine series of the winged-perforated class. There are comprehensive exhibits in most of the museums; especially at Washington, New York, Chicago, Boston, Columbus, and Philadelphia. Several of the larger museums greatly exceed the Andover exhibit in point of numbers of these unknown forms.

The Department of Archaeology at Andover has been actively engaged since its foundation in the accumulation of unfinished objects in slate, granite, shale, etc. In short, it has paid particular attention to these forms. The net result is that there are some 1600 such specimens in the museum, a large part of which exhibit various stages of manufacture. At some future time it is the purpose of the Department to publish a bulletin devoted to them, and, therefore, the references here will be necessarily brief.

Figure 69 shows four unfinished specimens of the winged type. In none of them is the drilling begun. It was the intention of the aborigines to complete the pecking, grinding and polishing before attempting the perforation. We can readily understand the wisdom of their action. A thin and delicately finished specimen is drilled with safety, whereas if first drilled it is weakened and subsequent pecking or grinding might destroy it. The rougher or heavier work, in most cases, was done first.

Selecting a block of slate or other banded and bright colored material the workman roughly fashioned it, using the ever-present hammer-stone, holding the block edge uppermost; that is, the grain of the stone parallel with the body. He struck it to right and left and then turned the stone over and repeated the process. Not unlike the first chipping on a block of flint is this preliminary work. Indeed the processes are almost identical. A sharp pointed stone is used in pecking the specimen into the form presented by the four objects in Fig. 69. The manipulation is simple and consists of thousands of gentle blows. Grinding follows and last of all the polishing.

Reed drills, the writer thinks, were preferred to others of flint or bone. The drilling in the majority of specimens is very

3785 3784

a b c d

FIG. 69 — EARLY STAGES OF MANUFACTURE OF UNFINISHED CEREMONIAL STONES FROM THE OHIO VALLEY

S. 1–2

Figures 69–70–1–2 were loaned by *Records of the Past*, to whom the writer is indebted.

a c
b d

FIG. 70 — UNFINISHED CEREMONIAL STONES FROM THE OHIO VALLEY S. 1–2

even and true. Some unfinished types in every collection contain cores — clear evidence as to the use of hollow drills.

The left hand figure in fig. 69 is from Indiana, the other three were found on Shimer's farm, Martin's Creek, Pa. In the secondary stage the slate-bands scarcely appear, and it is only when the polishing is complete that they are brought out clearly.

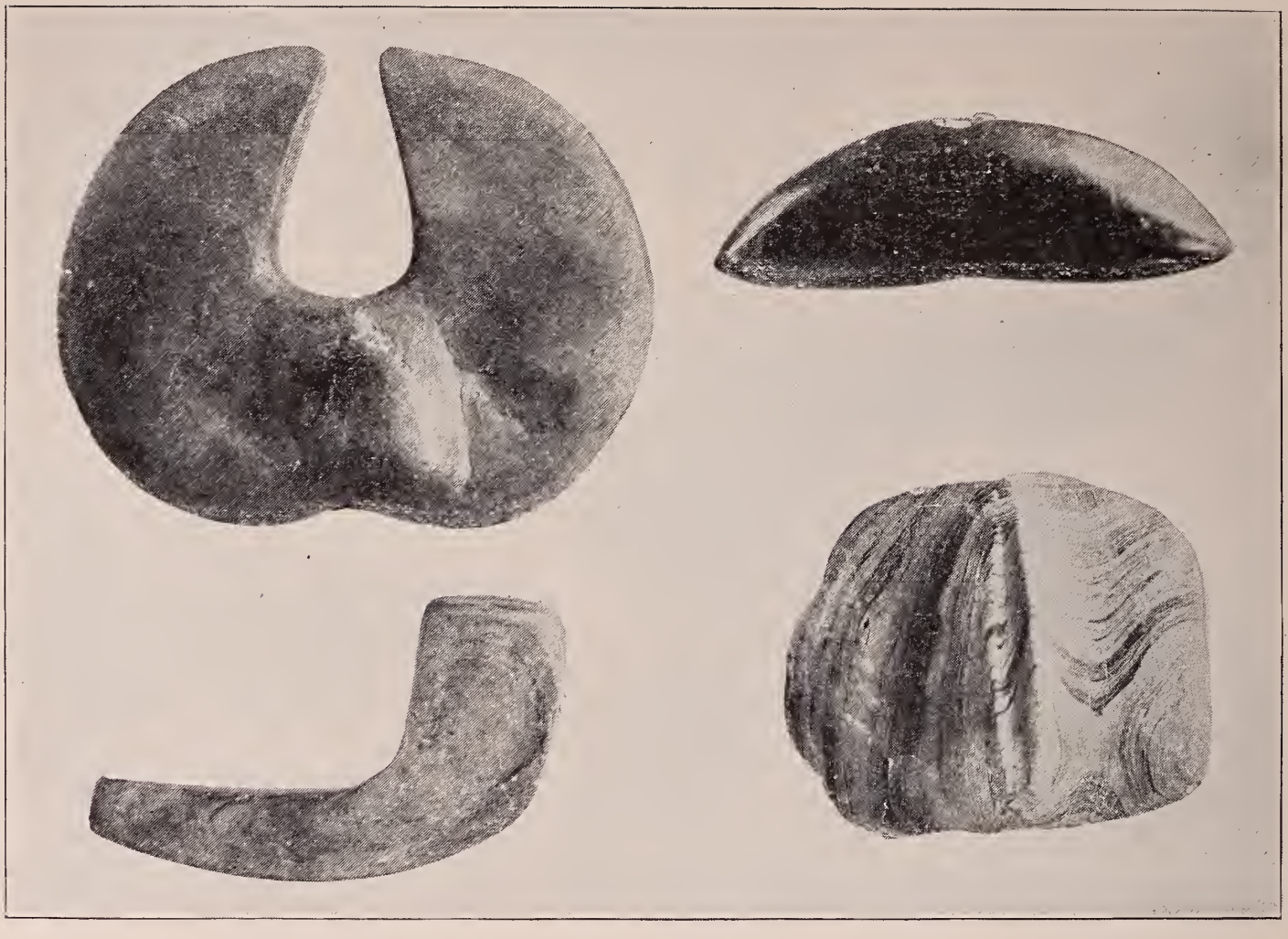
In fig. 70 A from Ohio is almost ready for the grinding. C from Ohio, and D from Indiana, have been pecked and the grinding is partly completed. The L-shaped object B (Ohio) is ground and now ready to be polished.

In fig. 71, specimen A is finished. B is all complete save the perforation — as is C. D is polished but not drilled. All are from Northern or Central Ohio.

Fig. 72 shows four completed types. A, the "butterfly," is from Southern Ohio. D, of granite, was found near Cairo, Illinois. B and C are from Ohio and made of slate.

Fig. 73 , introduced by way of comparison, shows one specimen quite different from the broad winged types and may, possibly, at some future time, when these objects are better understood, be found to con- vey a different meaning. They are from Western Indiana, of slate and well polished. The larger specimen is of peculiar form.

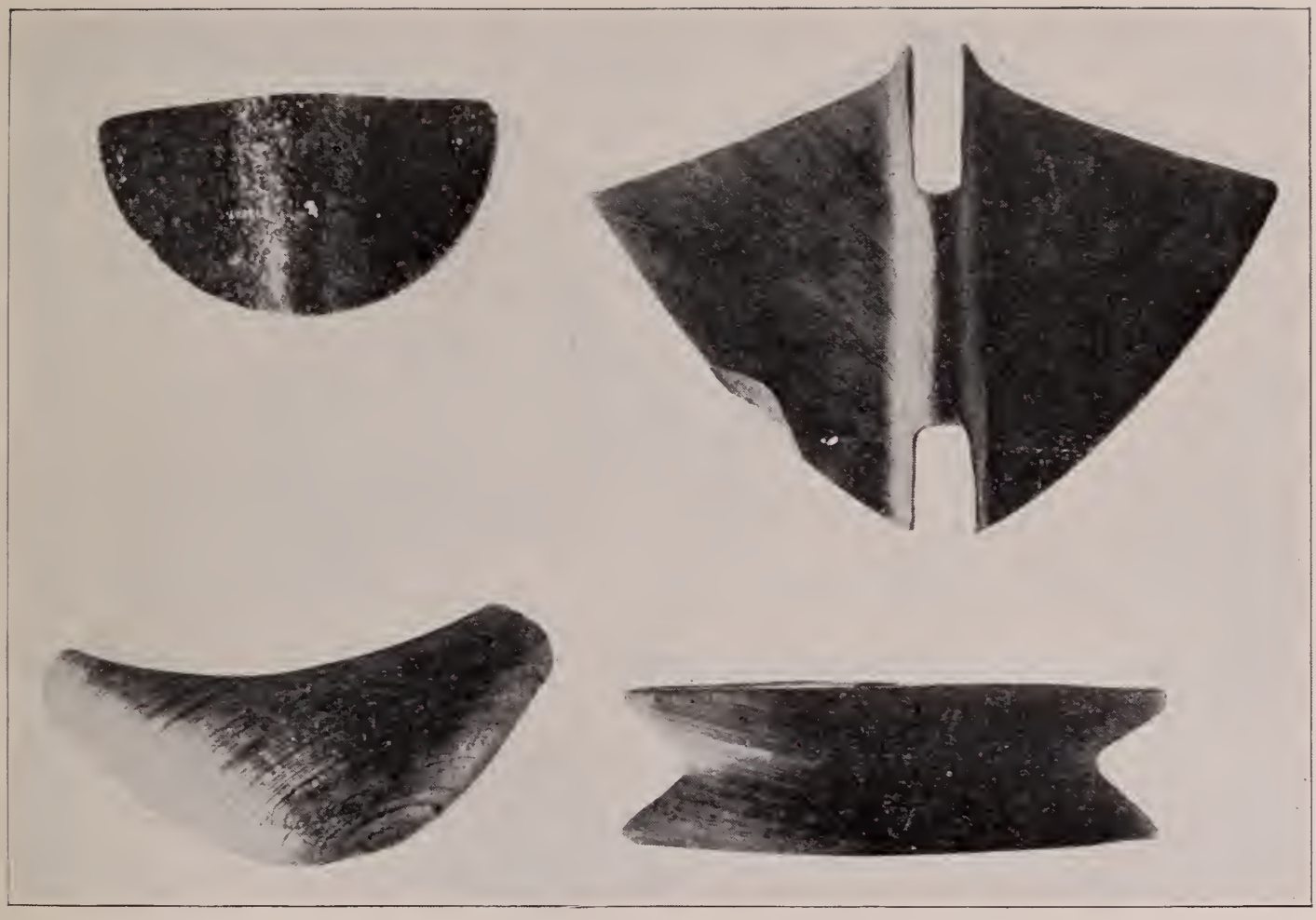
From the small ovate slate bead one can build up a graduating series until the larged "winged butterfly" is reached. Beginning with the pick one can make a series that ends in the double crescent. The Department grouped three hundred typical specimens into eight or ten different series. The drawings or outlines were made on large sheets of paper, each series covering half a line or more and terminating in some other series. A sheet was mailed to each of the museums and the curators were requested to outline any forms not represented. An examination of the net result enabled one to classify types according to locality, and brings into strong relief the fact in the territory of sedentary tribes these things are most numerous. They are almost entirely absent on the Great Plains and in the Rocky Mountains ; they occur in limited numbers in New England. They are not very numerous in the Carolinas or Florida. They are most common in the Mohawk valley, the Ohio valley (in-



b a
d c

FIG. 71 — CEREMONIAL STONES, NEARLY FINISHED

Ohio valley S. about 1–2



d a
c b

FIG. 72 — FINISHED CEREMONIALS

Ohio valley S. about 1–2

cluding the Tennessee and Cumberland) and the St. Lawrence region. As was remarked in the Department's Bulletin relating to "Gorgets," it is impossible to draw a sharp line of demarcation between many of the series.

It is said of that strange form "bird-stone" that it was seldom met with out of the Iroquois region. That statement to the mind of the writer does not imply that "bird-stones" were used among the Iroquois although such may be the case. Of the "problematical" class as a whole, the claim that they are primarily Iroquoan cannot be substantiated. The range is too great and most of the forms, except the "butterfly," have been found in mounds and gravel interments.

Whether the "winged-perforated" object comes from Wisconsin or Kentucky, the concept is the same although the form may vary.

How did this peculiar form originate? From the north and east did they go westward and southward, or *vice versa*?

These are questions easy to ask and difficult to answer. The modern tribes know nothing concerning them. That they mean more than mere ornaments we are quite willing to concede. A study of the "butterfly" from the rough block of slate to the completed form has given us some new facts. But the primary questions regarding these objects are, at the present writing, unanswered. Whether we shall be able to ferret out a correct interpretation, remains to be seen.

A suggestion made by Professor Edward H. Williams, Jr., of Andover (formerly of Lehigh University), regarding the age of problematical, ceremonial, or ornamental forms should be remembered by museum curators and students. Professor Williams visited the museum and inspected the various collections. During the course of a conversation with the writer he proposed that an analysis and examination of the surface of certain of these stones be made. Accordingly the Curator sent some fifty specimens of the type described in this section of the Bulletin to Professor Williams. In a letter dated April 7th, '06, he reported on them at length. His entire observations will be published in a future Bulletin.

Suffice it to say here that Professor Williams was assisted by Professor John D. Irving who is secretary of the Geological So-

FIG. 73 — THREE PECULIAR CEREMONIALS

From Ohio S. 9–10

Mr. Willoughby suggests that the spool shaped, decorated object was made use of as a stamp. It was coated with paint, then held between the thumb and forefinger and rolled along the arm (or chest), thus leaving a colored pattern.

ciety of America. Both of these gentlemen are thorough geologists and mineralogists. Professor Irving examined each problematical form through the microscope.

It is determined as a result of the examination that some of these stones were weathered or etched to considerable depth. Others appeared more recent. Probably more than one-third of the specimens showed considerable antiquity. In one case a stone was; "originally a dolomitic shale, now highly altered to a metamorphic slate." Another; a decomposed rock of the trap variety had become so weathered and softened that it was almost entirely chlorite. Thus the descriptions continue. The observations of Professors Williams and Irving are important in that they open a new field to the archaeologist in the study of specimens. This microscopic examination coupled with the use of the metric system and a careful study of perforations, of broken specimens that have been remade into others, will doubtless enable archaeologists to solve many problems.

FIG. 74 — ARROW POINTS

From the Pacific Coast — Agate, Carnelian and Obsidian S. 1-1

TWO EARTHWORKS NEAR ANDOVER.

On the estate of Mr. Charles L. Carter, known as Carmel Hill, is a curious, low earthwork almost obliterated. It can be traced on the west side for 53 meters; on the north for 44 meters, and on the east 43 1-2 meters.

At Haggett's Pond, three miles west of Andover, is another embankment totally different from that of Carmel Hill and 66 meters in extent. Both of these earthworks have been superficially examined by the writer and numerous small holes dug in each and in the surrounding ground. Absolutely no trace of the purpose of construction of such works in this vicinity could be found.

The works at both places were reported to the several gentlemen in New England who are interested in colonial antiquities and to Professor F. W. Putnam and Mr. C. C. Willoughby of Harvard University. Both works have been visited repeatedly by the writer and studied carefully but, up to the present, whether they are works of Indians or Europrans it was impossible for him to determine. The work on Carter's Hill is not traceable save on the three sides mentioned, and how far it extends to the south is not known.

Mr. Carter's estate and residence are upon a hill some three hundred feet in height, overlooking a broad valley that slopes toward the north until the Merrimack is reached. The Merrimack, three miles distant, flows east. The valley was a great resort for Indians as all observers in New England are aware. There are many specimens in the museums at Salem, Cambridge, Andover and Concord from this region and some twenty-six collections in the hands of private individuals. In colonial times there were villages at various points from the mouth of the Merrimack to the head of Lake Winnepesaukee.

Mr. Carter's hill commands a splendid view of the surrounding country.

With a view to obtaining the opinion of a more competent judge, Professor Putnam of Harvard, was asked to inspect the

FIG. 75 — ARROW-POINTS

From the Pacific Coast — Agate, Chalcedony, Obsidian and Carnelian S. 1–1

FIG. 76 — DISCS AND TURTLEBACKS

Flint Ridge, Ohio — First to second stages of manufacture S. 1–4

two earthworks. Unfortunately he was unable to visit Andover, but kindly sent his Assistant Curator, Mr. C. C. Willoughby, who is one of the best archaeologists and ethnologists in New England. Mr. Willoughby, in the company of the writer, inspected the two earthworks November 7th. Mr. Willoughby gave it as his opinion that the Carter's Hill work is not Indian; that the hill top had been long cultivated and that a stone wall or a fence once enclosed the space known as the "fortification". Continued ploughing, presumably in the same direction, gradually worked earth from the field against the wall, where it banked up. After the wall was removed the ridge remained as a landmark. He pointed out several other fields, as we drove to Haggett's Pond, where the same condition was manifest. It was clearly to be seen that were the walls removed, small earthen "embankments" would also surround those fields. It is likely that generations of cultivation are required to produce this result. However, with regard to the embankment at Haggett's Pond, Mr. Willoughby was of the opinion that it was a part of an Indian stockade. He based his conclusions upon a careful examination of the site.

The embankment is 66 meters long. The ditch is on the side furtherest from the pond, and the work itself is (estimated) 400 or 500 meters from the water's edge. From the bottom of the ditch to the top of the embankment is some one and one-third meters, although at certain points the ditch is not so deep.

Within the trench, upon the embankment and upon the eastern or pond side, are numerous large old growth stumps. On the opposite side (west) there are no large stumps, and the growth is manifestly of recent origin. The land a few hundred feet to the west has been long under cultivation. The ends of the trench and embankment are nearly obliterated, but enough remains to indicate that at these points they turned abruptly to the west, and continuing, formed originally the northern and southern boundary of the fort or stockaded village. Mr. Willoughby therefore concluded that the present embankment is all that remains of an enclosure which surrounded an Indian town, the northern, southern, and western embankments having been ploughed away and the ditch filled by early owners of the farm. The soil at the point where the embankment still stands may

have been poor, or the timber may have been thick and heavy. At any rate, for some reason this portion of the work was not obliterated by the landowners.

The village was rather extensive in size, and palisades crowned the embankment. Mr. Willoughby considered the site interesting and important.

The writer is quite willing to accept Mr. Willoughby's suggestions as to the origin of both works.

FIG. 77 — LEAF-SHAPED AND UNFINISHED IMPLEMENTS

Flint Ridge, Ohio — Third and Fourth stages of manufacture S. 1-4

FIG. 78 — BLADES AND SPEARS

Practically complete — Flint Ridge, Ohio S. 1–4

THE PICTOGRAPHS ON A FRAGMENT OF BIRCH BARK

Every museum has something among its collections that cannot be explained. The Department at Phillips Academy, Andover, is not an exception to the rule and we have stored away in one of our cases, in order that the light may not injure the ancient fragment, a piece of birch bark found in the former "buffalo country" near Fairfield, Iowa, and on which are certain pictographs or unknown characters.

Whenever something unusual is found and particularly when such an object is covered with unknown characters, the cry of "fraud" is raised. Let it be understood that the writer does not believe that the so-called engraved stones — that is, stones on which hieroglyphics are carved — are genuine.* And the writer has fondly hoped that he might never find, during the course of explorations, anything that would indicate a knowledge of writing among primitive people north of Mexico. Therefore, this find is personally more or less of a disappointment and the writer wishes to make that statement in all sincerity and with emphasis.

After due investigation and examination, it seems to the Curator that the fragments of birch bark cannot be proved to be a fraud.

First — A sufficient proof of its antiquity is in the fact that the log in which it was found has been cut with a stone axe or celt, and that the closest scrutiny fails to reveal that the cavity within the log was made with steel tools.

Second — That the characters are not a combination of known characters of any language and not such as a child might make or as a person familiar with the English alphabet would be apt to produce. Comparison between that and the tablets known to be fraudulent, reveals no similarity in character, design, conception, or art.

Third — That the human figure surrounded by sun symbol (?) and the animal (buffalo ?) are both exceedingly crude.

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* This statement is confined to Mississippi valley finds.

That the characters are chiefly angles or straight lines accompanied by dots, and may constitute description of country or a map.

Fourth—That Mr. Griffith, who found this, is a plain, honest workman, not a practical joker, knows nothing of antiquities, is not a collector of specimens. Furthermore, that there is no practical joker in the neighborhood.

Fifth—That Miss Emma Clark, an intellectual young lady of Fairfield, Iowa, and a teacher, having heard of the writer corresponded with him regarding the MS., and proposed that it be preserved in a local school or library.

Sixth—That the gum or resinous substance covering the log appears to be aboriginal make and neither wax, glue, or other substance known to white man.

Seventh—The strongest proof of the antiquity of this birch bark fragment lies in the fact that it is not perfect. This in itself is a detail that does not impress one until due study is given the fragment.

As against the antiquity of this interesting object no one has gone on record in print. In fact, the object has not been mentioned save in the newspapers at the time of the discovery. To be perfectly fair to those several gentlemen who do not believe it genuine Indian work, the writer wishes to state that they did not give any special reasons but simply ventured the opinion that it was not genuine.

The history of the find is as follows: September 2nd, 1896, Mr. J. T. Griffith was employed as a laborer on the water works excavation. About three feet beneath the surface he dug up a chunk of wood 21 cm. long, 13 cm. wide and 8 cm. thick. This was coated with dark pitch and the whole thing slightly charred in order to add further to its preservation. Splitting it open with the pick there was a space in the center about 10 cm. long and 7 cm. wide and 2 cm. deep in which was a roll of birch bark. As is usual on the Plains a strong wind was blowing and as he unrolled this birch bark what was estimated to be three or four times the size of the present fragment was whipped off by the wind and carried away and lost. Mr. Griffith did not know the character of his find and brought the log and the fragment with him to Fairfield, where Miss Emma

FIG. 79 — FLINT CORES AND FLAKES

Flint Ridge, Ohio S. 1–4

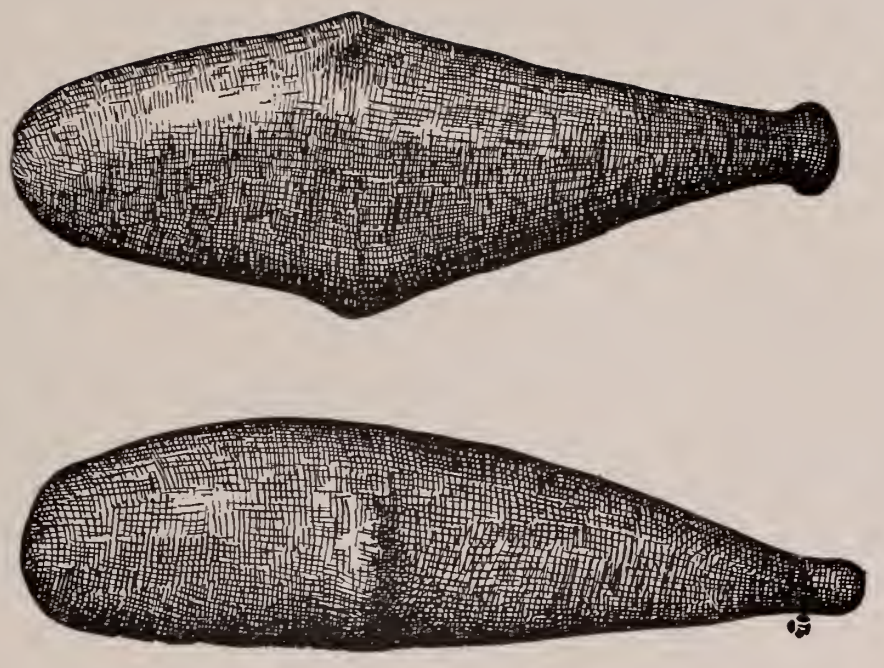

FIG. 80 — EFFIGY OF A WHALE

New England S. 3–8

Figure 80 is a specimen found near Fall River, Mass. It appears to be an effigy of a whale. Number of rude effigies, more or less whale-like in character, are found along the Atlantic seaboard in Connecticut and Massachusetts.

Doubtless the whale would excite wonder in the minds of aborigines — hence the effigies.

Clark, who had heard of the archaeological museum at Columbus, Ohio, corresponded with the writer.

The bark is about as thin as paper, of natural color and well preserved. The writer is informed that there are no birch trees near Fairfield, Iowa. Further excavation revealed nothing. Miss Clark recognizing that something unusual had been found at once enclosed the birch bark between two plates of thin glass. On the reverse of the fragment nothing appears. The editor of the County paper, Miss Clark and other citizens at the instigation of the writer made thorough investigation, all of which substantiated the claim that the "so-called MS." was found as described. The citizens wished to have it preserved in Fairfield. At the time of the discovery no value was attached to it. Mr. Peabody purchased the birch bark and the log for a small sum solely with a view to their preservation.

What these characters mean I leave to others. The newspapers at the time stated that they were Maya or Aztec. Some of the characters may or may not be similar to Mayan glyphs. Mayan scholars must decide that.

The drawings by Mr. Foster present the characters (fig. 82) and the log (fig. 81.) The characters appear to be done in blood. If this is erroneous, the writer courts correction. As they have faded the past few years, it has been found necessary to keep them in a dark drawer. It is impossible to photograph the log as there is not sufficient contrast to bring out the cutting. Both specimens will be shown visitors at the Andover Museum and as the writer considers the find of exceeding great importance, he would be glad to have a thorough examination made of the site and of the specimens themselves.

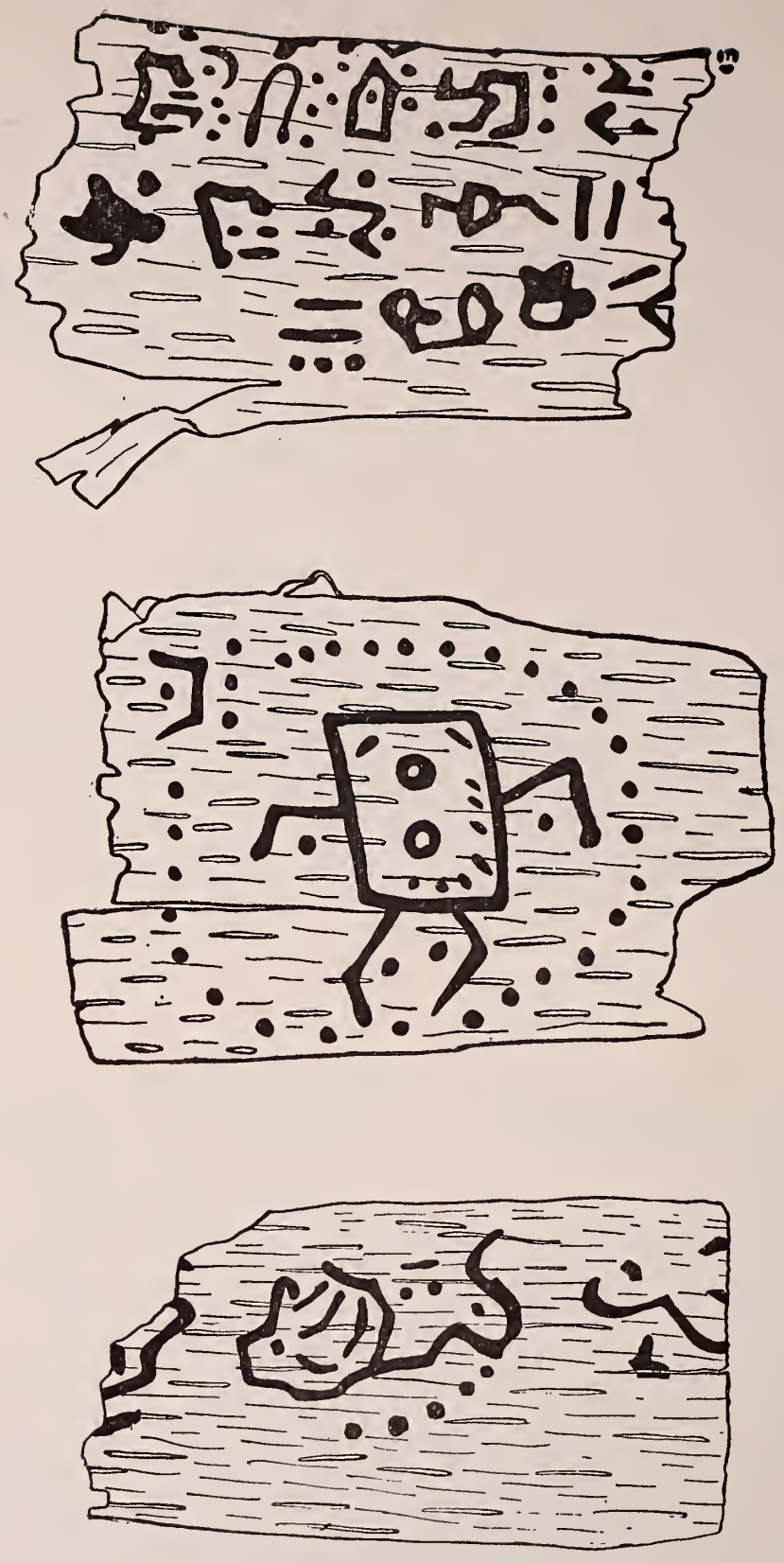

FIG. 82 — CHARACTERS UPON THE BIRCH-BARK

S. 1–2

SYNOPSIS OF SPECIMENS (ACCORDING TO NUMBERS) IN THE PHILLIPS ACADEMY MUSEUM.

In the following totals it will be observed that there are numbers of entries. Hence under the term "ceremonial" the total is not indicative of the number in the museum. "Plummets", "unknown forms", etc., and other names specifying kindred objects, should be included.

"Gorgets" are 57, yet "Ornaments" 296 and "Pendants" 143 would total 496 and they are all of the "So Called Gorgets" class.

Gorgets	57
Pottery, clay objects	5249+
Hematites	249
Pipes	205
Shell objects	2300+
Anchor stones	3
Red breccia	60
Cave breccia	26
Stalagmites	75+
Copper	90+
Human and animal bones	*1510+
Skulls	164
Skeletons	17
Obsidian implements	678+
Flint objects	1752+
Stones and stone objects	480
Slate objects	118
Rubbing stones	67
Adzes	9
Chips and spalls	2000+
Cupstones	22
Paint stones	24
Teeth	73
Effigies	98
Bicaves	82
Tubes	66
Meal grinders	5
Spear-heads	2527+
Arrow-heads	12255+
Amount carried forward,	30262+

*Includes bone implements

Amount brought forward,	30262+
Knives	2708+
Scrapers	1204+
Triangular points	1308
Projectile points	354+
Broken implements	4833+
Unfinished implements	2878
Celts	1717
Axes	542
Hammerstones	583
Ceremonials	271
Ornaments	296
Pestles	290
Mortars	60
Metates	19
Mano stones	113
Notched stones and sinkers	133
Perforators	412+
Chisels	22
Gouges	87
Discs	713
Pendants	143
Plummets	54
Unknown objects	121
Quarry rejects	163
Wooden objects	11
Photographs	150+
Paintings	2
Prints	27
Negatives	200+
Drawings	376+
Lantern slides	530
Spindle whorls	26
Unfinished chipped objects	84
Bird stones	20
Arrow shaft straighteners	4
Stone and quartz implements	341
Chert implements	23+
Nodules	71
Cones	13+
Tablets	43
Cannel coal objects	6
Tomahawks	7
Amulets	19
Casts	27
Hoes	29
Spades	11
Amount carried forward,	51306+

Amount brought forward,	51306+
Leaf-shaped implements	41+
Turtlebacks	26
Cups	19
Mauls	8
Lava objects	10
Miscellaneous objects	4518+
Total	55928+

LIST OF ACCESSIONS TO THE MUSEUM FROM MAY, 1901, TO NOVEMBER 1, 1906.

In this list the names of residences of donors are omitted.

Name	Objects	Museum No.
Abbott, Miss C. H.	Gouge	26770
Abbott, Howard Y.	Projectile points	2677-87
Addis, Albert L.	Finished and unfinished ornaments and ceremonials	25614, 742, 850, 25874, 875, 31011-15, 32337-39
Adler, A.	Hammerstone	26562
Allen, Thomas W.	Stone implements and arrows	3690+
Amburst, Ferdinand.	Skull	41763
Amherst College	New England Collection	25001-212
Amidon, R. W.	Pottery, bones, etc.	3263+
Amiet, J.	Pottery fragments	20789-891 5100-9385 5365-5399
Anderson, Clifford	Specimens from near Fort Ancient	9301-9385 20947-20999 22561
Angus, L. W.	Spear, arrows, etc.	3149+, 34819-20
Angus, William	Grooved axe	26755
Appleton, R.	Pendants and arrow	21627, 628, 640
Arthur, J. J.	Iron arrow, bone tips	27272-274
Avery, Frank	Arrow-head	21192
Baatz, Capt. C. L.	Hammerstones, flints	23097-177
Batchelder, John	Waterworn stone	
Bailey, A. M.	Grooved hammer	22485
Bailey, H. R.	Maine objects	23276-310
Bailey, J. W. T.	Pottery, shell objects, etc.	5093-95, 32433. 444
Baker, Mr.	Grooved axe	10575
Baker, Mrs. Sue Leland	Pottery	3244-50
Barnes, Frank S.	Set of Archaeologist	Library
Barrott, A. F.	Stone implements	2802-25
Barry, J. B.	Pipes	21631, 634
Bateman, F. A.	New England objects	41670-760
Beale, Albert	Hammerstone	21186
Beencks, Chas. J.	Pottery	2553-60
Bell & Smith, Messrs.	Arrow-head, Axe	4371 ' 3684
Beman, J.	Spear-head	21554

Name	Objects	Museum No.
Boys of Elmira, N. Y.	Arrowh-eads	21768
Brawner, Morgan	Flint implements	21112-125
Briggs, Harry	Stone implements	22481-82
Brown, E. A.	Arrow-head	16432
Bryan, Ward E.	Pottery fragments, flints, stone objects	18510-575,21765-767, 769, 22488, 493-500
Bullis, Roy H.	Stone and flint objects	6971-75, 77-77
Bushm, A. E.	Flint implements	19470-581, 25586-590
Bushey, F. E.	Bushey Cavern material	4798, 41488, 41651-667
Bushnell, D. I.	Maori adze	16428
Bussing, D. S.	Shells, arrows, pottery	5077-90
Butler, Fred	Unfinished ceremonials, pottery, fragments, flints	1777-87
Butts, E.	Pottery fragments and stone objects	2253-59
Caldwell, F. M.	Copper and photos	20429-433,21800, 21802-805, 807
Carter, Charles	Mortar	26513
Carter, N. E.	Unfinished ornaments and ceremonials, sugar quartz objects, etc.	34811-16, 19556, 26761-767, 791-803+
Cary, C. N.	Ornament and drills	21565-66, 600
Chubbuck, C. K.	Axes and flints	23633-665
Clark, William	Celt and arrow	21183, 556
Clegg, Thos.	Skull, stone implements	38897-907-39854, 26416-430
Cleveland, William	Arrow	21569
Clyne, Dr. A. C.	Rubbing stone	4795
Coates, Irving W.	Pottery fragments	16322-43
Cole, John N.	Unfinished object	18585
Craig, J. C.	Hematites,stone implements	16344-380
Cuddeback, Asa	Spear-head	21195
Cummings, A. G.	Arrow-head	3075
Cummings, Mrs. L. A.	Chips	3074
Curts, Milo	Flint implements	26436-449
Dane, L. A.	Hammerstone	29985
Davis Bros., Messrs.	Celt	41669
Decker, J. E.	Flint implements	1794-99
Deisher, H. K.	Skulls, bones, motars, pestles, arrows and spears	25732-860,31092, 31093, 31094, 35625-632
Derby, J. H., jr.	Knives and arrow-heads	24790-798
D'Olier, J. G.	Cast of pipe	20995
Doyle, J.	Spear-heads	21580.583

Vame	Objects	Museum No.
Duprey, H. F.	Shell ornaments, beads, arrows, etc.	2943-46, 3222, 3470-75
Eacker, L. B.	Unfinished stone objects	38173-195
Eastwood, Geo.	Pottery	20376-428
Elder, T. L.	Arrow-heads	Used for exchange
Ellsworth, W. E.	Pottery fragments	18594-615
Emery, Prof. W. O.	Ceremonials	38205+
English, S. A.	Mortar, arrows	2584, 3002-17
Erwin, S. W.	Arrow-head	20594
Farson, J. S. N.	Arrows, etc.	26992-27000
Fenton, W. T.	Cast	20996
Field Columbian Museum	Implements from Trenton gravels, collected by Ernest Volk	27117-263 and used for exchange
Finear, F.	Pipes	21636, 643
Foster, William H.	Stone implements, arrows, etc.	4366 70, 29531-542, 29552-560
Foster, Philip	Gouge, ornament, flint implements, etc.	
Gardine, Bud	Spears and arrows	41565-67
Gesner, Rev. A. T.	Bones from Mandan sites	26826-864
Gilham, F. M.	Obsidian collection	4384, 27287-307
Gillis, Mrs. R. S.	Pottery fragments	
Gillis, A. W.	Axe	27275
Gleason, L. C.	Arrow-heads	24506-507
Gledhill, W. F.	Arrows	19577-21000, 31095-99
Goldsmith, Wm. G.	Mortar and pestle	38206, 88207
Goodell, C. S.	Pottery fragments and arrow-heads	35565-570
Goodnow, H. S.	Waterworn stone	
Gordon, John S.	Quartz implements	18312-318
Gould, Prof. Chas. N.	Rejects	5468-75, 5477-84, 5554-64, 5827-39
Grabosch, M. M.	Unfinished and broken implements	27319-332
Gray, Miss Alice	Hammerstone	36090
Gray, James H.	Gouge	21180
Gray, S. C.	Pottery fragments and flint implements	20136-231
Griffing, W. J.	Pottery fragments and flint implements	16173-205
Grove, Frank L.	Unfinished objects	26966-976
Grover, Ed.	Arrow-head	21555
Hall, Miss Mollie	Prestle, celt, flints	23666-672

Name	Objects	Museum No.
Hale, Geo. G.	Arrows, spears and broken implements	4777-87, 4789-94, 24508-517
Hampson, J. K.	Pottery fragments	25702-739
Heater, Spencer	Knife	21584
Herriot, Seneca	Celt and arrows	3495-500, 3503
Higgins, Bryant	Map, stone implements, pipes, etc.	25861-872
Hight, H. H.	Argillite chip	16306
Hill, S. L.	Stone implements	
Hillman, F. G.	Pottery bones, stone objects, etc.	3234-25, 6962-70, 19678-719, 25901-904-9
Hitchcock, T. B.	Mastodon teeth	
Hodge, H. G.	Pottery fragments and arrows	16266-305, 307-310
Holcomb, Benton	Stone objects, slate and stone spears, etc.	18445-509
Holcomb, I.	Stone implements, arrows	20325-375, 22978-989
Holland, Dudley	Obsidian implements	20527-529, 2571-719
Homan, F.	Stone objects, pottery	2266-67, 2927-35
Hope, Claude V.	Knives, arrows, spears	34802-810
Hopkins, A. L.	Hammerstones, scrapers, knives and spears	22196-276, 25291-305, 38255-260, 31024-047, 27277-286
Hopkins, Frank	Projectile points	21585-588
Hovey, G. U. S.	Scrapers	3217, 25, 20434-440
Hughes, F. M.	Ornament	4377
Humphreys, E. W.	Pottery fragments	3252
Husketh, James	Crystal	3223
Hydon, W. J.	Celt	21184
Jacobs, E. H.	Hammerstones, spears, unfinished objects, etc.	38693-895
James, J. B.	Pottery fragments	18680-740
Jenkins, L.	Stone implements	22491, 528
Johnson, C. E.	Pottery fragments	3073
Kern, D. N.	Unfinished and broken implements and pottery fragments	15503-5, 15411-13, 15409, 15415-18, 15421, 15885, 15888, 15982-83
King, Gilbert	Soapstone fragment	18441

Name	Objects	Museum No.
*Kinney, D. A.	Pottery and flint implements	4502-12 18383-392
Latham, Roy	Hammers, quartz implements	16433-560, 662-666, 16669-672
Lathrop, W. H.	Arrows	26991
Lawson, P. V.	Pottery fragments	19645-51,658-60, 19667, 68, 73-76
LeClerc, J. F	Pestle	20589
Levering, Richmond M.	Arrows, celts, stone implements	735-999, 1003-1100, 1111-1250, 1492-98, 1500-1545
Lewis, J. B.	Mortar, pestles, and plummets	3031-47, 3218
Ling, Reamer	Pottery	
Love, W. H.	Chesapeake and tide-water specimens	2952-75, 2977-99
Lowry, Otho B.	Stone implements, etc.	19009-119 26514-560
Ludwig, Daniel	Axe and pestle	3219-20
McLain, W. G.	Stone mortars, pottery	17918-928
McMahon, T.	Broken implements, beads, pipe fragments	21597, 98, 6391, 641, 21642
McWhenney, Mrs. H.	Texas arrows and spears	26576-597
McWhorter, L. V.	Pipes, effigy, stone implements	1802-3, 10538
Marland, Mrs. Abraham	Stone implements from Merrimac valley	3227-32
Martin, W. J.	Flint implements and pottery fragments	19930-996
Mattern, J. E.	Stone implements, flints	3120-25, 27-48 3202-15
Metzger, T. C.	Broken implements and pottery fragments	2847-50
Miller, H. C.	Knives, broken objects, etc.	20703-727
Minchin, J.	Unfinished implements, deer antlers, etc.	20281-324
Miner, Charles	Arrows	18365-375
Missouri Historical Society	Casts of flint objects	35606-624
Mitchell, James	Scraper	20530
Moore, Clarence B.	Pottery, celts, stone implements, discs, crania, etc., from Florida, Georgia, and Alabama	38896-39635, 40275-499 and
Moore, J. E.	Arrows, knives, etc.	26812-825
Moore, Mrs. J. F.	Flint, pottery fragments, obsidian	20728-788
Moorehead, Miss Mabel	Knife and spear	22511, 26758

Name	Objects	Museum No.
Moorehead, W. K.	Various implements	Scattered
Morris, G. E.	Stone implements, arrow-heads	27000-625
Mott, Raymond	Stone implements	27323-27431
Neville, T. J.	Flint implements	21562, 573
Newlon, Dr. W. S.	Flint objects	22926-38
Noe, Dr. Chas. F.	Axe, knives, spears	25534-46, 76-85, 15987, 31075-091
Nourse, Geo. D.	Spear-head	2561
O'Brien, W. E.	Celt, broken pipes	21593, 644-50 22397
*O'Brion, John	Knife, scraper, arrows	3466-69
Osburn, A. G. and S. R.	Stone implements	25638-652
Panning, H. G.	Celt, axe, spears and arrows	20579-588
Peabody, Dr. C.	War club, effigy from Greece, obsidian implements, Bushey Cavern material	3102-19, 19661, 41473-487, 489-562, and others
*Peabody, R. S. (Foundər)	Original collection collected by himself. All implements purchased or collected for Mr. Peabody given by him to department	All numbers not credited to others
Peck, H.	Beads	21190
Peck, J. W.	Stone mauls	4439-42, 4386-87
Peel, J.	Arrow-heads	21570-571
Penney, J. W.	Pottery fragments	3452-58
Pennock, F.	Grooved hammer.	21624
Perkins, C. A.	Unfinished objects, discs and knives	16206-265,21200-539, 22644,925 31016-023
Phillips, Chas. S.	Spears, arrows, knives	35985-36088
Pickering, M. S.	Gouges	16312-13
Piper, Richard	Photos.	21801
Pomeroy, O.	Clay pipe fragments	3365-66, 3446
Prentice, G. A.	Discoidal, arrows, spears	2589-600
Price, Miss Anna V.	Arrowheads	1790-93
Prokes, Joseph N.	Tufa.	2587-88
Radley, W. W.	Pottery and flints	4459-62, 4477-87
Reed, Alva S.	Cloth, brass, bones, etc., from Iroquois sites.	2527-37, 2539-43, 25876-900 35798-850
Reeder, J. T.	Sheet copper.	4796-97
Reigo, A.	Knife and spear-head.	21761-62

Name	Objects	Museum No.
Roberson, Wilson	Flint implements.	16381-427
Robinson Bros.	Pitted stone, pottery fragments	20802-817
Rogers, E. H.	Flint implements.	16317-321
Ropes, E. E.	Pottery fragments	38229-254
Ruggles, Chas.	Stone implements, pottery	3534-50, 3577-99
Schuyter, C. S.	Iron axe.	21751
Scott, Wm.	Celt, spears and arrows.	21179, 196-99, 553, 21557-561, 567, 568, 21572
Seacrist, E. F.	Scraper	26772
Shelby, Mrs. Jane.	Discs, knives, spears, etc.	30999-31010
Shoemaker, L. D.	Sinkers, pottery, arrows, etc.	4452-62, 7529-39, 26759-760
Short, Frank	Gouge and celts	21594-596
Shrawder, W. H.	Pipe, gorget, flints	22402-407
Simpson, Prof. A. M.	Mandan pottery	25601-603
Slade, W. S.	Notched stones and flint implements.	4379-82
Smart, J. A.	Spear-head.	35782
Smith, C.	Bird stone, perforated stone, spear-heads	21752, 58, 63, 64
Smith, J. R.	Unfinished, broken, and quartz objects	3233-43,30018-35 34294-306 35779-80
Smith, J. T.	Knives, discs, etc.	22939-977
Smith, S. L.	Knife	22487
*Smith, W. N.	Obsidians	25638-52, 25701-17
Smith, Z. T.	Flint implements.	22201-380
Smithsonian Institution	Stone implements	21006-25, 32-44, 21052-69, 77-91, 21102-110
Snively, Benj.	Celts and arrows	2564-75, 3685-89
Stannard, Mr.	Fossil, stone point	18442-43
State Historical Society, Des Moines, Ia.	Cast of large axe.	41764
Stearns, Samuel.	Unfinished New England implements	
Steinbrueck, E. R.	Mandan material.	2353+, 2377+, 2520+, 26910-961
Stewart, Arch V.	Spears, arrows, beads, etc.	38318-344
Stewart, Mrs. Susan A.	Stone implements, unfinished objects, arrow-heads, etc.	3477, 3003, 4800, 15259-62, 396-97, 15399, 402, 26768-69
Stiefel, Victor H.	Arrows	Used for exchange

Name	Objects	Museum No.
Stilwell, L. W.	Unfinished ceremonials.	9231+, 9245+, 22517+, 27264+
Stoddard, R.	Bone and flint implements, pottery	2714-25
Strevell, C. N.	Broken and unfinished flint objects.	20001-135
Swarthaut, G. E.	Gouge	21592
Swift, R.	Gouge	22490
Talbot, A. R.	Hammerstone.	2585
Tarbox, Mrs. C. W.	Clay object	4383
Taylor, J. D.	Unfinished axes	9111-13
Taylor, J. L. B.	Material from the vicinity of Jacobs Cavern	21188+, 22398+, 26450-512
Taylor, W. A.	Hammerstones	3253-62
Thacker, W. H.	Pestle, anchor stone, hammerstones, slate points, etc.	3048-50, 52-71, 5052-56, 58-66, 5069-75, 20531-39 25571-575
Thomas, J. D.	Arrow-heads	21770-778
Thompson, C. A.	Pottery fragments	35636-660
Tooker, Paul S.	Unfinished objects, sinkers, spears, etc.	10537, 37796-38149
Treganowan, Alfred	Hematites, triangular points, pottery, etc.	20540-550, 553-558
Tuttle, L.	Unfinished object	21756
Tweed, J. W.	Arrow-heads	Used for exchange
Updegrove, Harry T.	Unfinished stone objects	26773-790
Van Kirk, J. W.	Stone implements, flints, and pottery	35934-956
Van Rensselaer, Stephen	Perforator, spear, arrow	25568-70
Vaughan, F. E.	Shell objects	26979-984
Walsh, Thomas	Stone implements, and broken ornament	38901-904
Ware, Geo. O.	Arrow-heads and knives	22991-23020
Warner, Miss Rose	Pottery fragments, flint chips, shell	38261-317
Waterbury, A. H.	Drill	21760
Welch, Irving	Celts	21753-55
Welty, John	Stone objects, mussel shells, pottery fragments	16809-925 19652-53,, 35740-752+
Wemmet, Clarence	Celts, knives, bone beads, pottery, etc.	21185, 574-75, 21577-79, 618, 629, 21630

Name	Objects	Museum No.
Westbrook, E. H.	Paint stone and pestle . . .	21277-178
Whelpley, Prof. H. M. .	Flint implements	16721-730
Whitney, Dan	Celts, hammerstones, beads	21181, 82, 87, 91, 21590
Wilcox, Calvin	Celt and grooved axe. . . .	22480, 484
Williams, Prof. E. H. . .	Scrapers, arrow-heads, knives, etc.	26382-26415
Wilson, F. A.	Unfinished stone objects, arrow-heads, etc.	2502-512, 2514-19
Wilson, G. H.	Birdstone, flint implements	21599, 602-610
Wing, E. T.	Stone implements	23178-195, 401-427
Witmer, Dr. I. M. . . .	Arrow-heads	35912-933
Wooff, J. W. P.	Flint implements.	20232-280
Wren, Christopher . . .	Sinkers, jasper objects . . .	2936-44
Wright, B. H.	Stone implement.	22486
Young, Calvin M.	Pottery fragments	4385

*Deceased.

THE PRESERVATION OF ARCHAEOLOGICAL SPECIMENS.

It will be seen by the foregoing pages, that it was the purpose of the founders of this Department to encourage the study and preservation of archaeological material. As the museum building is fireproof, it offers a safe repository for collections.

The circulation of BULLETIN No. III will be somewhat extensive, and the Curator wishes to call attention of the alumni of Phillips Academy and of collectors of archaeological specimens, as well as those persons who know of such exhibits, to the Department.

The Curator will be glad to enter into correspondence with persons who know of prehistoric village-sites, mounds, caverns, or other places of archaeologic interest. The Department particularly desires specimens from various portions of the United States, and will pay transportation charges upon such and give the donors due credit in the official catalogues and BULLETINS.

APPENDIX

A BRIEF DESCRIPTION OF FLINT RIDGE*

BY GERARD FOWKE

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* Reprinted from *Primitive Man in Ohio.* New York, 1892.

APPENDIX.

FLINT RIDGE.

Aboriginal man was a practical lithologist. Unacquainted with any method of reducing ores, he was unable to avail himself of the harder metals, and consequently was compelled to utilize some form of stone in the manufacture of implements intended for ordinary use. The glacial drift, covering three-fourths of the State, furnished an abundance of material for axes, pestles, celts, and other utensils required for rough work; but, while quartzite, syenite, and diorite are well adapted for making any tool or weapon which must be both hard and tough, they are unsuitable for use when a keen cutting edge is necessary. For the latter purpose nothing else at the command of the ancient artificer was so suitable as the different varieties of chalcedony. Obsidian and the various forms of agate, so plentifully at the command of Indians in the extreme west, could not be obtained by the prehistoric inhabitants of the Ohio valley, who were therefore forced to adopt the flint, hornstone, chert, and chalcedony found nearer home. These occur in quantity from central Ohio eastward, generally imbedded in limestone, but sometimes replacing that rock to a

small extent. Many of these deposits contain stone that is coarse, impure, of uneven texture, or otherwise unsuitable for the needs of the primitive hunter or warrior. Direct exposure to atmospheric agencies also detracts from its availability, the manner of cleavage being so altered that the stone no longer splits into conchoidal flakes when struck, but shatters or breaks into irregular fragments. Thus, while a small, sharp-pointed fragment of stone, such as could be picked up almost anywhere, might be serviceable for an arrow-head, the requirements of a manufacturer of finer flint implements were more difficult to meet. He must have a stone very hard and compact, of homogeneous texture, free from any admixture of foreign material, with a definite line of fracture that could be determined beforehand, and covered by a stratum of earth or rock which would prevent deterioration by weathering; at the same time the overlying mass must not be of such depth or solidity as to prevent convenient access to the desired material.

In the State of Ohio there are two flint deposits presenting these essential features to a marked degree.

The first of these is between Newark and Zanesville. At no other place in the Ohio valley can be found so great a quantity of this material; and probably nowhere else in the United States are to be seen aboriginal excavations on so extensive a scale. The magnitude of the deposit is such that it has given to the locality the distinctive name of "Flint Ridge," by which it is well known to geologists and

collectors. Its outline is extremely tortuous, owing to the erosion that has made the whole country a succession of hills and ravines. Throughout its length it forms the cap-rock of the high land, all the superincumbent material having been either removed or converted into soil.

The salient points of the surface in the region being practically in a horizontal plane, while the dip of the rock is to the southeast, it follows that the flint stratum was, at its eastern end, first covered by a considerable thickness of earth. The rounded knolls characteristic of the landscape are in some places eighty feet above the flint. This, however, is not common; for the most part the overlying earth is only a few feet in depth, and toward the ends or sides of the numerous ridges the flint stands out in relief.

Geologically the formation belongs to the carboniferous or coal-measure rocks, being the last or uppermost layer of the "Putnam Hill Limestone" of the Ohio Geological Survey.

A fine bed of cannel coal lies one hundred and four feet below the flint, and is mined on a considerable scale. Bituminous coal also is found south of the ridge, some distance below the level of the flint stratum; the exact interval has never been measured. If the Kittaning coal of the Pennsylvania Geological Survey were extended thus far toward the west, it would lie about thirty-five feet above the flint.

The western extremity of the flint is found in a detached hill in Franklin Township, eight miles

southeast of Newark. It here appears as a porous stone, similar to buhr or millstone, but more open or cellular. This continues only a short distance, when it is cut off by a depression formed by ravines having their beginning on opposite sides of the ridge, of which this hill was formerly a part. These ravines have worn back until they have broken down and removed all the flint, as well as much of the subjacent rock.

Beyond this depression is a level tract extending eastward a little more than a mile, with an average width of about four hundred yards. Much of the flint about the outcrop is of the same nature as that to the west; but there are several places where the exposed portions are quite solid and nearly white in color. The main body of the deposit has been protected from weathering by a considerable thickness of earth; in places where this has been removed the flint proves to be translucent, very dense, and with a decided tinge of blue, thus almost answering the description of chalcedony.

Another depression similar to the one noted above, and due to the same cause, terminates this body of flint to the east. In this, on the north side, is a mine from which the cannel coal has been taken for many years.

Reappearing east of this depression, the flint extends without another interruption for nearly three miles. The outcrop along the northern side of the ridge in this part is tolerably regular, and follows, approximately, an east and west line; on the southern side, however, several spurs project to a distance

of more than half a mile. There are also detached hills and ridges which once were connected with the main ridge, but have been cut off by erosion.

Beyond this large area of flint is an interval of three fourths of a mile in which the flint is entirely absent, except in scattered fragments or boulders sufficiently compact and homogeneous to resist the destructive atmospheric agencies that have reduced the general level from forty to sixty feet below the surface of the limestone which underlies the flint stratum.

After passing this the flint is again found, but much of it is buried beneath a thickness of earth that precludes any definite knowledge of its nature. Such of it as is visible, either along the slopes or occasionally in places on the surface where removal of the soil has been more marked, is either buhr-stone or a white, compact stone whose monotony of color may be due to weathering; for fragments about the ancient quarries show a considerable variety in texture and color, many of them being quite translucent, others containing an amount of carbonaceous matter that makes them almost black, while still others have the bluish-gray tints of chalcedony.

This portion of the deposit, which at one point is almost a mile in width, extends in a general easterly direction for fully a mile beyond the Muskingum County line; it then trends toward the north, forming a curve whose farthest limit is a mile to the north of any other part of the ridge.

How much farther it may have extended eastward cannot now be ascertained; but the present termination is certainly much within its original boundary, for the rock which juts out from the hillside at its very extremity is thicker than the flint at any other point, there being a vertical exposure of fully seven feet. How far downward it may reach is not known. In a number of places in the west and middle portions of the ridge, wells have been dug and other excavations made; but nowhere has the stone been found more than four feet in thickness.

The entire length of the deposit, measured on a section line, is eight miles, and its greatest breadth is three miles. Its actual area as it now exists is probably not more than four square miles, the remainder having been removed by denudation. It is not improbable that, as deposited, it comprised fully thirty square miles, with an average thickness of four or five feet.

Baryte is found in small quantities in some places; quartz crystals are abundant; while nearly all the flint, except the clear chalcedony, is highly fossiliferous.

As to the evidence of human occupation and industry, the first remains of this nature are on the western end of the level tract mentioned as extending to the depression in which the coal mine is situated. A space of about ten acres is here surrounded by an ancient wall built of flint blocks that have been gathered up along the outcrop on the hillsides. The enclosure has almost disappeared, the stones

composing it having been hauled away by those cultivating the field. Enough remains, however, to indicate its outlines. It commanded the valleys to the north and south, the wall being carried along the hill just at the top of the slope on either side, and connecting across the level surface of the ridge. Before being disturbed it was fully five feet in height and eight or ten feet in breadth at the base.

Within the walls are two mounds not more than thirty feet apart. One, built entirely of earth, is fifteen feet in height, and seventy-five feet in diameter at the base; the other, a pile of loose stones heaped together, is not more than three feet in height, with a diameter of fifty feet.

This structure was undoubtedly designed as a fort. From the north or south, approach is possible only by climbing a steep hill strewn thickly with angular fragments of flint and sandstone; from the east or west an attacking force would have a level space to cross, with little opportunity for shelter from the missiles of the defensive party.

Nothing else of artificial character is found on this hill; there are no quarries, workshops, or other remains, until the great deposit east of the coal mine is reached. Here occur the most interesting features of the entire region. Few persons have ever seen more than a small part of it, and yet such superficial examination as can be made in a day's visit will impress the observer with a feeling that he is viewing the scene of operations by comparison with which the construction of Ohio's most extensive earthworks would be mere holiday sport.

On almost every farm thousands of cubic yards of earth have been removed that the flint beneath might be reached. Acre after acre has been so thoroughly excavated that scarcely a single foot of earth or stone retains its original position. Hundreds of wagon-loads of spalls cover the ground, the refuse of ancient implement making. In many places one may walk forty rods or more in a direct line with the certainty that nowhere within fifty feet of him would it be possible to find a spot that had not been dug for a depth of five to fifteen feet, or even more. To comprehend fully the labor necessary to accomplish all this, it must be borne in mind that the subsoil is as solid as the earth in a public highway. Sharp picks, wielded by muscular arms, cannot be driven into it more than two or three inches. The stone, when reached, is so extremely hard that, unless favored by a baryte or crystal deposit, a person, in digging a well, for example, may have to work an entire day with the best steel drills in order to make a hole deep enough to put in a blast. When one witnesses the slow progress made by good workmen aided by steel and powder, and remembers that the Indians had no better tools than they could fashion from wood, bone, or stone, and when he finds further, that it requires several days merely to walk over the area included by the ancient quarries, he realizes the vast amount of toil involved in these excavations.

Eleven miles from Newark the Zanesville road is intersected by the road leading from Brownsville, on the old National Pike, to the Baltimore and Ohio

Railway. This point, locally known as "The Ridge Cross-road," is one mile east of the coal mine, and three miles north of Brownsville. For fully half a mile to the east, west, and south, and half that distance to the north, the debris from pits and workshops literally covers the surface, not only on the spurs and minor ridges, but in many places on the lower ground. Most of the stone is very solid, though some of it is so porous as to be unfit for use.

One of the pits near here is almost a hundred feet in diameter. A pole eighteen feet long has been thrust full length downward into the muck with which it is filled, without reaching the bottom.

The flint in this entire central area shows an almost endless diversity in coloring. Much of it is milk-white. There are large beds, perhaps a hundred acres in all, of striped jasper, the colors being alternate light gray and dark gray in thin and regular bands. This is an excellent material for arrow- and spear-heads, and has been extensively quarried. Segregated masses occur of lustreless, dull black, gray, or yellowish-brown. These contain various impurities, and apparently were not sought after. At various places, but mostly in the immediate vicinity of the cross-road, are immense deposits of what should have a distinct classification as "Flint Ridge Stone." It is a chalcedony, pure or nearly so, but differing somewhat in appearance from that in any other known locality. When thoroughly protected from weathering it is of a light grayish-blue color, translucent in pieces of considerable thickness,

exceedingly hard, and yet, when freshly dug, easily wrought by the usual methods in vogue among modern Indians. When exposed to the atmosphere for a long period it assumes an almost infinite variety of tints, equalling or even surpassing in beauty and brilliancy the finest agates or carnelians. But, no matter how it may have changed in other respects, it retains a peculiar gloss or lustre that enables one familiar with it to detect at a glance an implement from this locality, no matter where it may be found. This property has been useful in aiding to establish two facts. First, that people using it covered a wide territory; weapons made from it have been found in New York, Illinois, and eastern Virginia, as well as nearer to its source. Secondly, that the aborigines resorted to this spot for a long period of time, perhaps many centuries; chips or blocks of exactly the same composition found side by side on the surface vary greatly in appearance, some being as yet scarcely affected by the exposure, the exterior of other pieces being completely changed in color, while in still others the change of color may be uniform through the fragment.

It was quarried anterior to the construction of some, at least, of the large mounds in Ohio and West Virginia, for many arrows, cores, and flakes of it have been found in them. In the large mound described in chapter xiv., a chip of it was found lying upon the original surface as if it had been carelessly thrown there prior to the beginning of the first or oldest part of the mound.

It was unquestionably used by the Indians occupying the Ohio valley at the time of its settlement by the whites, for thousands of implements made of it have been picked up on or very near the surface of the ground in spots where it is known that modern tribes had their domicile in quite recent times.

Several hills situated between the ridge and the National road were once part of the plateau covered by the flint; but erosive agencies have cut them off, and they are now entirely isolated. On all of these which retain their former elevation excavations have been made on a very large scale. None of the material here, however, has the diversified colors so noticeable in that nearer the cross-road.

The only indications of permanent occupation along this portion of the ridge are three circular enclosures—two near the cross-road, now obliterated by cultivation, the third a mile and a half south. The last, which is still quite distinct, consists of an embankment with interior ditch, the outer diameter being about three hundred feet. They are probably the sites of small stockaded villages or camps. There are also two small mounds of earth, both of which have yielded human bones to investigators.

On the third principal deposit of the flint, that lying along both sides of the line between Licking and Muskingum counties, the excavations are on a smaller scale than those heretofore noted. There is but one group of pits west of the county line; these extend over an area of five or six acres. They occur at a place where the covering of earth was quite thin, and present no features worthy of special notice.

The first excavations in Muskingum County are small. The stone is of the same general character as the chalcedony at the cross-roads, and therefore well adapted to the uses made of it; but the quantity of earth to be removed before it could be reached was an obstacle too great to be overcome, and the attempted quarries had to be abandoned.

It is not until the margin of the flint area in this direction is reached that evidence of extensive work is found. Almost the entire spur forming the northern and eastern extremity of the deposit has undergone extensive denudation, owing to the peculiar arrangement of the drainage system about it; consequently the stone is easy to reach. The pits extend very nearly to the final outcrop on the east and as far toward the north as workable material is to be obtained. But they are all shallow, and the immense piles of refuse show that only a small portion of the stone obtained was fit to be wrought into implements.

Careful researches by various parties have shown the methods by which the primitive worker obtained the coveted material and made from it weapons or implements suitable to his wants.

Probably numerous experiments and repeated failures in working the fragments found on the surface had taught him that if he wished to make specimens of symmetrical form and definite outline, he must procure a stone that was solid and uniform in texture. Either by accident, or by the use of his reasoning powers, he discovered that such material is to be found in the ground instead of upon it.

Digging away the earth with such tools as he could improvise—pointed sticks hardened by fire, antler, bone, or stone,—he came to the surface of the flint. This resisted all his efforts until he thought of the effects of heat. Placing wood upon it, he set fire to the pile. When the stone had reached a high temperature he threw cold water on it; this caused it to shatter and crack in all directions. Casting aside the fragments, he repeated the operation, until he had finally burned his way to the limestone beneath. Removing all burned portions of the flint, he next procured a quantity of fine clay and spread a thick coating on the top and sides of the stone, to prevent injury to it. Then building a fire at the bottom of the hole, he soon burned away the limestone and the lower part of the flint stratum, leaving the top projecting. This he broke loose with large boulders of quartz or granite; hammers of this sort, weighing from twenty to one hundred and fifty pounds, have been found in the bottoms of pits that have been cleared out. Knocking loose the clay, which had burned almost as hard as the stone, he found himself in possession of a block of clear, pure flint. By means of the same hammers he broke this into pieces of a convenient size for handling. These were carried to a spot near by, which may be termed a "blocking out" shop. Here they were further broken by smaller hammers, and brought somewhat into the shape of the implements which were to be made from them. The work was never, or very seldom, carried beyond this stage at the spot where it was begun; the subsequent manipulation was at some

other place, best designated as a "finishing shop." These are characterized by quantities of small chips, flakes and spalls, broken implements, and unfinished pieces, which were unavailable by reason of some flaw or defect not discernible until the final work was begun. The finishing touches were always made by means of pressure with a bone, antler, or some other tough substance. Many finishing shops are located near the quarries, others at a distance, some of them several miles away. The principal one was near the cross-road; here a pile of fine chips, covering one fourth of an acre, and fully six feet in depth at the central portion, existed when the country was first settled by the whites, but from various causes it has been reduced until it now is all of one level. This, while the largest, is only one of several hundred such places.

Second in importance only to Flint Ridge are the aboriginal quarries of Coshocton County.

They are located on the south side of the Walhonding River, four miles above Warsaw. The flint forms the cap-rock of a high hill intersected by numerous ravines, and is covered by a layer of earth whose thickness varies greatly owing to the contour of the surface.

The area worked over, the piles of earth thrown aside by the diggers, and the fragments and blocks of stone scattered about in profusion, show that this was long a place of resort by the Indians.

In one place is a pit more than one hundred feet in diameter, whose depth has never been ascertained, owing to the accumulated earth and decayed organic

matter that forms a bog within it; but the quantity of debris scattered on every side shows that a great amount of labor was expended in opening it. In many other places in the vicinity smaller holes bear witness to the same industry. As a rule, these follow a line parallel with the outcrop of the flint. One of them has been cleared out, and the process of excavation found to be the same as that followed at Flint Ridge. On most of the hill-tops, the superincumbent earth, having in some places a thickness of twenty-five feet, or even more, proved an efficient barrier against such tools as the ancient workers could procure.

The most interesting feature of this quarry is in a ridge or promontory bounded on three sides by the river and a deep ravine, the sides being very steep—almost precipitous in places. A careful exploration of its summit has never been made, but sufficient evidence is at hand to justify the statement that the Indians began work at the outcrop on one side, next to the river, and followed the flint stratum entirely across to the outcrop above the ravine, throwing the earth and refuse material behind them as they proceeded. Probably five acres have been removed in this manner, while the sum of the areas dug in the different pits would be still greater.

The flint forming this deposit is of various shades, from a pale amber or "honey color" to a jet black, much of it being banded like agate, or variegated with colors imperceptibly blending. The lighter varieties are translucent or almost transparent, in pieces of considerable size; the darker are

usually opaque except in very thin chips. In much of it the grain is as close as in the finest agate or chalcedony, consequently it is susceptible of very delicate manipulation. Some of the specimens from this locality are as thin, symmetrical, and highly finished as can be found among the best of those belonging to the neolithic age of Europe, and many may be found which, after decades or even centuries of exposure to an inclement climate, have an edge or point almost as keen as a piece of freshly broken glass.

To a people living in the condition of the early inhabitants of the Ohio valley, stone possessing such qualities was invaluable. Arrows, spears, and knives were essential to their existence, and in the absence of steel or iron no better material is obtainable for the manufacture of such implements than the finer grades of chalcedony, of which the Coshocton flint is a variety, or the "Flint Ridge Stone," which is fully equal to it. That the aborigines fully understood their worth for such uses is proven by the evidences still remaining of the great amount of labor which they performed in obtaining them.

There are various other flint deposits in the State that have been worked to some extent, notably those in Perry County. In fact there is scarcely a county along the line of this geological formation, from the western border of Pennsylvania to central Kentucky, where these flint quarries do not occur. None of them, however, present any feature, except it be in the character of the stone, that is different from

what may be observed in the two localities herein described.

A short explanation of the origin of flint deposits may not be out of place.

Certain microscopic organic bodies belonging to both animal and plant creation extract from the sea-water in which they exist small quantities of silica, which enters into their composition as lime enters into the shells of mollusks or the skeletons of animals belonging to a higher class. Most sponges also abstract from the water silica, which may be found in them in minute particles. On the death and decay of these organisms the silica is released and settles to the bottom. Being in the finest possible state of subdivision it forms a very compact mass which, when free from impurities, hardens into fine-grained chalcedony or flint. Should there be contained in it foreign substances of any sort the stone is correspondingly altered, and there may result all the different varieties of flint, chert, buhr, and similar stone, which is so abundant as compared with the purer kind.

It is essential in this method of formation that the water in which it has its origin should be free from currents, and containing a smaller proportion of salt than in the open ocean, otherwise the necessary forms of life will not thrive. These conditions can only be met with in a small gulf almost enclosed by land, or in a depression protected by shoals, and in either case receiving a constant supply of fresh water with silica in solution. In this way is formed most of the chalcedonic stone occurring in large de-

posits. Flint Ridge was thus made; we find the baser stone or chert around the edges of this deposit nearer to the old shore line, while the finer grain of the central deposits shows a body of water untroubled by currents and free from sediment. Moreover, the deposit is irregular in its bedding, being considerably lower in some places than in others, showing that it was laid down on an uneven bottom. The single blocks or boulders, lying in some places many feet above the main body of flint, are of later origin.

A second manner in which rock of this character may be made is by a process of substitution or petrifaction. A body soluble or subject to decay, being covered with water charged with mineral of any sort, will, under certain conditions, be changed from its natural form into one exactly similar in shape and size agreeing in composition with the mineral solution in which it is immersed. As each particle of the original substance is removed it is replaced by a particle of the dissolved mineral; and after a time the entire body is thus changed. In this way are formed petrified forests, silicified wood, and the many fossil remains that have been converted into flinty rock.

Still a third method in which such stone is formed is by deposition. Water settling into a cavity and evaporating must deposit all the solid matter contained in it. If this be repeated a sufficient number of times the cavity will be filled; and should the deposits thus made be of matter held in solution and not merely carried mechanically, they may harden

into a stone much more compact than that by which they are surrounded. Such is the origin of most agates, opals, and stones of that character. Should the evaporation be exceedingly slow crystals will be produced, their size and perfection depending upon the length of time allowed for their completion.